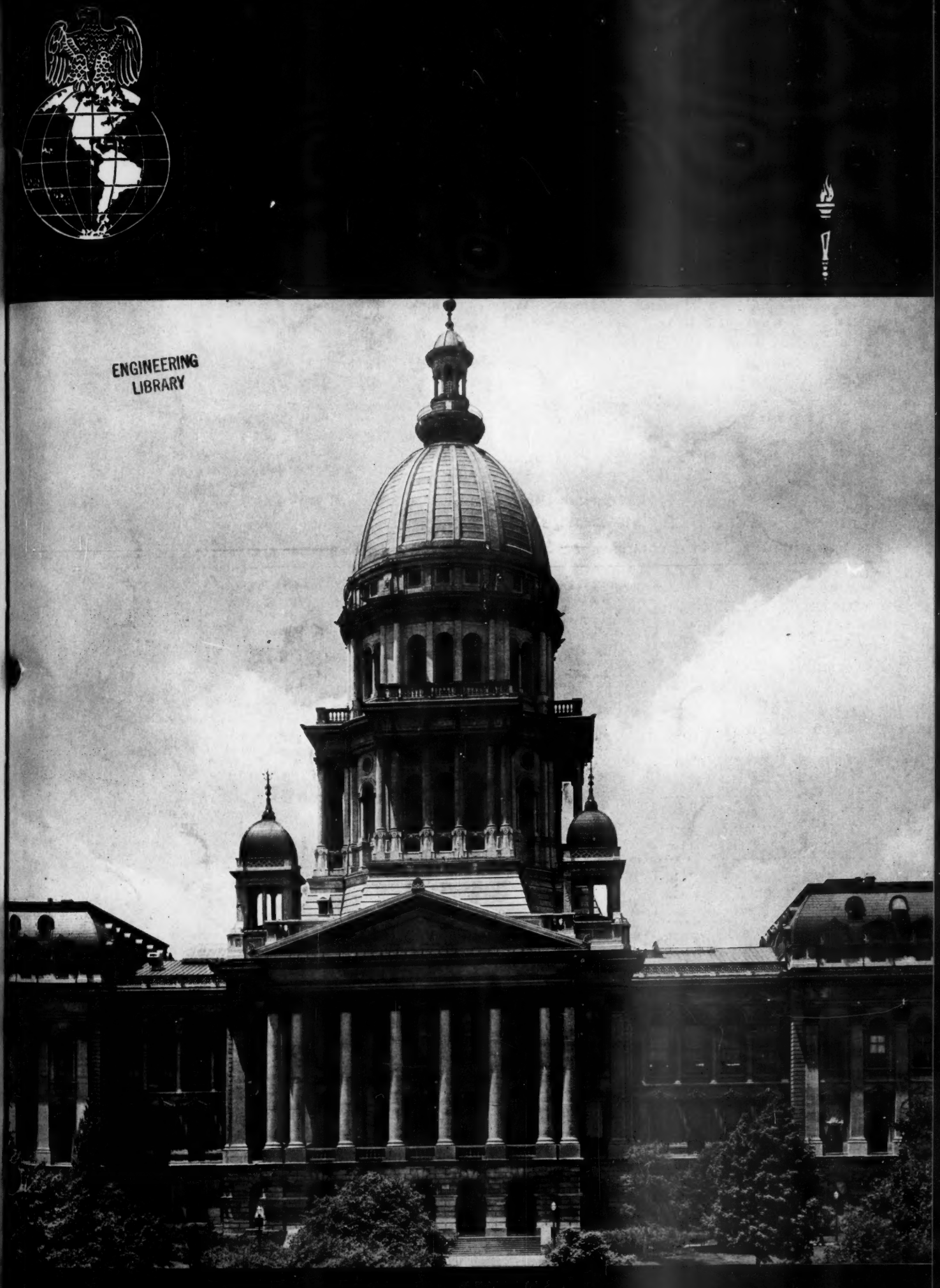
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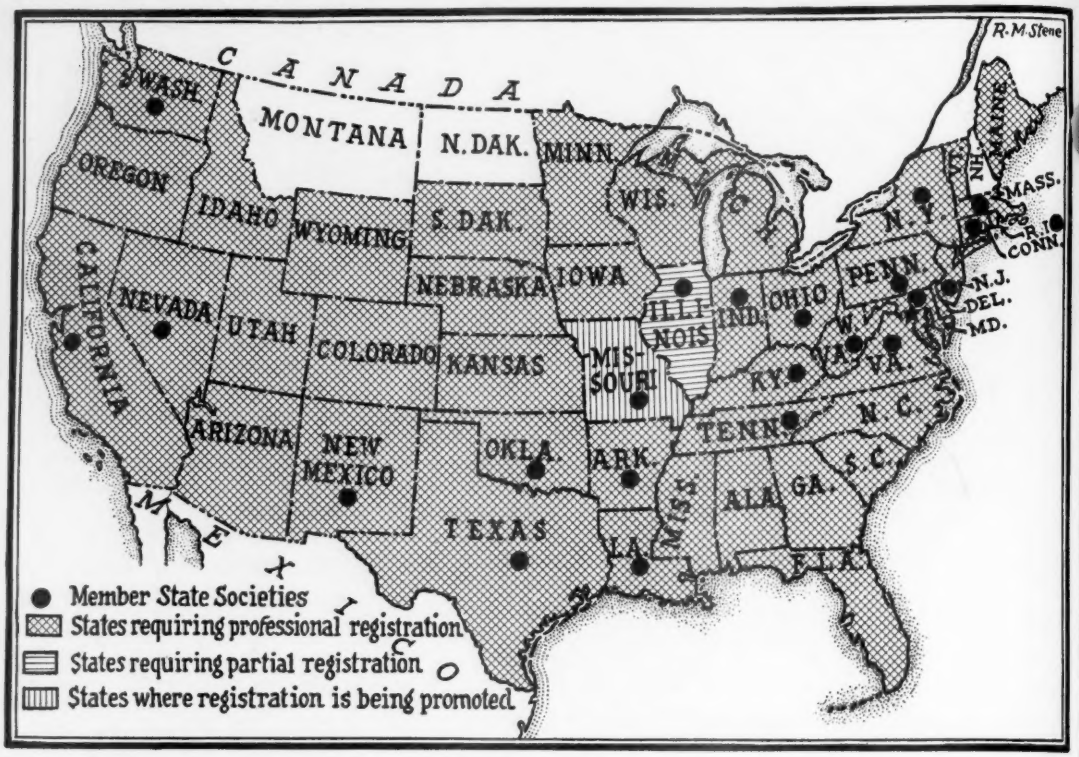

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THE AMERICAN ENGINEER

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Volume Ten | June - July, 1940 | Number Four

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THE COVER

Since Illinois has been chosen as our 1941 convention State, we are showing a cover picture of the main building of Illinois' State Capitol.

Just as Chicago is a grand convention city, so Springfield is a splendid capital city. It has the reputation of being one of the most beautiful in the Country.

The American Engineer assumes no responsibility for statements or opinions expressed by contributors. Their names identify the source of the same.

Entered as second-class matter February 17, 1937, at the post office at Harrisburg, Pennsylvania under the Act of March 3, 1879.

Subscription Rates

$1.00 a year, in advance, to members of the National Society of Professional Engineers and its affiliated Societies, $2.00 a year, in advance, to non-members. Single copies, $.50.
Published bi-monthly from December to November inclusive, by the National Society of Professional Engineers.
For advertising rates write G. R. Bolan, 222 North Third Street, Harrisburg, Pennsylvania.

EDITORIAL • • •

Cooperation in Census of Engineers for National Defense

Our Washington headquarters and our editorial office have been besieged with requests that the National Society of Professional Engineers conduct a census among members in order to list their peculiar qualifications for military or non-military aid to the Federal Government in the event of war or other extreme emergency.

Under authority of an Act of Congress of the early 1920s, the Assistant Secretary of the Navy and the Assistant Secretary of War have created a Board which has appointed a National Committee on Construction Preparedness. This committee consists of the following organizations and their presidents:

American Society of Civil Engineers
John P. Hogan, New York

American Institute of Architects
Edwin Bergstrom, New York

The American Institute of Mining and Metallurgical Engineers
H. G. Moulton, New York

The American Society of Mechanical Engineers
Warren H. McBryde, San Francisco

American Institute of Electrical Engineers
F. Malcolm Farmer, New York

American Institute of Chemical Engineers
Webster N. Jones, Pittsburgh

American Institute of Consulting Engineers
Philip W. Henry, New York

American Society of Heating and Ventilating Engineers
Frederick E. Giesecke, College Station, Texas

American Society of Military Engineers
Brig. Genl. G. B. Pillsbury, Ross, Calif.

American Society of Refrigerating Engineers
George E. Hulse, New Haven, Conn.

National Society of Professional Engineers
John C. Riedel, New York

Secretary of the American Society of Civil Engineers, George T. Seabury, has been made chairman of this committee, and it is he who sends questionnaires, after the several participating societies have submitted to him names and addresses of those engineers, or engineering firms, in private practice who are now available for the design, supervision and construction of defense facilities.

It is desired that, in the event of an emergency, there will be as little dislocation as possible among engineers engaged in the essential industries, utilities and in government service.

Later, it is planned to develop a classified list of architects, engineers, draftsmen, surveyors and specialists who may be available to work with firms or individuals who are assigned projects to design and supervise.

On June 27th, President John C. Riedel sent a letter to each of the State Society presidents. Following is an extract:

> "As you doubtless know from the minutes of the May 18th meeting of the Board of Directors, the National Society of Professional Engineers offered its services to the President and Congress in the interests of National Defense.
>
> "In order that we may effectively carry this through, it would be well if we had a classification of our members as to their qualifications and experience. If each State Society prepares this classification, the effort and expense will be small. For our Washington office to undertake this is impossible with the restricted budget on which the National Society is operating. Some of the State Societies are busy preparing the suggested classification.
>
> "I would request, if you have not already undertaken the preparation of the classification, that you proceed as expeditiously as possible to determine the required information regarding those engaged in construction work within your State. Should you have already undertaken to make the classification mentioned, I shall be pleased to learn what progress you have been able to make."

Here is an opportunity for the National Society to demonstrate the advantage of its distinctive organization of member state societies, in that each State Society performs this function of collecting names within its area and forwards them to one central office which, in turn, sends the list to the general chairman of the National Committee on Construction Preparedness.

The National Society of Professional Engineers urges upon its membership complete and ready response to requests to fill out questionnaires sent out by this committee.

Let us in the engineering and architectural professions demonstrate that in a democracy there can be as ready response and as quick action from the professions as there seems to be in the totalitarian states.

ROBT. HALL CRAIG
Editor

NATIONAL SOCIETY NEWS

ANNOUNCEMENT

American Engineer to be Bi-monthly Publication

In accordance with a recent decision by the Board of Directors of the National Society of Professional Engineers, the AMERICAN ENGINEER, for the time being at least, will be issued as a bi-monthly magazine. This action, which has been contemplated for some time, was arrived at as a result of the constantly increasing number of state and chapter, or local organization publications which appear at regular intervals, usually once a month, and which effectively serve their several state groups. In some instances, these mediums, which began as news letters, have developed into well prepared and well edited journals. Under such circumstances considerable repetition is bound to occur and the continuation of the AMERICAN ENGINEER on a monthly basis does not appear to be justified.

The action of the Board of Directors does not in any sense commit the Society to a policy of a bi-monthly publication. However, the work of compiling and editing a monthly issue, a task for which neither the editor nor any other member of the Society receives any net return whatever, is a most burdensome one. The average person probably does not realize the time and effort required to prepare a magazine that must appear every month. It might be worth noting, to cite one sacrifice, that the person who prepares and edits the copy is practically deprived of any opportunity for even a two weeks' vacation. There are numerous details which require constant consideration and decision.

Doubtless there are some who will quickly respond to the comments contained in the previous paragraph by suggesting proposals to overcome the conditions referred to. The Board of Directors, as well as the editor, welcome suggestions. It is well to bear in mind, however, that the problems of publishing a monthly bulletin have been considered and discussed for a number of years without having developed, to date, any satisfactory solution within the capacity of the Society to effectuate. Practically every avenue of approach to the desired end has been explored. There is, of course, the hope that the finances of the Society will one day make possible the establishment of a publishing organization sufficient to produce a magazine worthy of the movement for which it speaks. The outlay required for this would be about one and one-half times the present cost of conducting the affairs of the entire Society, including the AMERICAN ENGINEER. Perhaps the advertising possibilities of a professional journal, reaching recognized practitioners throughout the country, may one day be developed to an extent that will make possible the publication of the AMERICAN ENGINEER as an indispensable monthly reference and guide to the engineering affairs of the nation and to the social, economic and professional considerations of the engineer.

Members are invited to express their reaction to the new policy of a bi-monthly publication. Readers are urged to offer comments.

RESOLVED

At a regular meeting of the officers and directors of the National Society of Professional Engineers held Saturday, May 18, 1940 in Washington, D. C., the following resolution was unanimously adopted and transmitted to the President of the United States, President of the Senate and the Speaker of the House of Representatives.

"The National Society of Professional Engineers in behalf of its member State Societies and Professional Engineers throughout the United States tenders its good offices and services, without qualification, in aid of National Defense."

National Society of Professional Engineers

(Signed) JOHN C. RIEDEL, *President.*

Honorary Members of the Society of Professional Engineers of France

Recently the Society of Professional Engineers of France awarded honorary memberships to several of our national officers. This is an extreme courtesy coming at such a time of stress in France.

We are printing the translation of a letter accompanying one of these awards.

The French professional engineers have our moral support and deep sympathy for their nation's plight. We have no present way of giving tangible thanks for these courtesies.

The Editor

Paris, France

Dear Sir and Colleague: May 27, 1940

It is with joy that, by this letter, I bid you welcome to the Society of Professional Engineers of France. In short, our Administrative Council has just voted unanimously to admit you as Honorary Member.

At this moment when my country is again undergoing an assault by barbarian hordes, I am especially glad to see strengthened the bonds of friendship which, for some years, have united us. It is during misfortune, it is said, that one may recognize true Friends.

I am persuaded that from this more effective collaboration will be born a new force which, when this war will have been ended by the Victory of the Allies, will tend toward avoidance of cataclysms of this sort.

Confirming your admission to the S.I.P., you will receive by registered mail a Diploma and a Placard. On the latter you will paste your photograph. However, we should be very grateful to you if you would mail us, for our records, a similar photograph.

Awaiting better days, when we may hope to meet, I beg you, dear comrade, to accept the assurance of my best wishes.

The President:

Gabriel Fournier

New York State Convention Attended by Over 1000 Members

Synopsis of Meetings-Resolutions Passed-Addresses Given

The Thirteenth Annual Convention of the New York State Society of Professional Engineers was held at The Commodore in New York on May 24-25.

At the Luncheon in the Hotel Commodore on Saturday, May 25, Engineer James F. Fairman, President of the Kings County Chapter, was the Toastmaster. The attendance at this luncheon was 500. The following officers were re-elected for another year:

President ....FREDERICK H. ZURMUHLEN
Vice-President .....ANDREW K. JOHNSON
Vice-President .....HUBERT E. SNYDER
Financial Secretary .....ERNEST F. FOX
Treasurer .....PATRICK M. CORRY
Historian .....ARTHUR V. SHERIDAN

At the luncheon, the Honorable Irving V. A. Huie, Commissioner of Public Works of the City of New York, represented Mayor LaGuardia and welcomed the Society on behalf of the City.

The following telegram from the Honorable Morris S. Tremaine, Comptroller of the State of New York, regretting his inability to attend as a speaker, was received:

"F. H. Zurmuhlen, President
N. Y. State Society of Professional Engineers, Inc.
Grand Central Terminal
New York, N. Y.

Regret exceedingly cannot be with you tomorrow at luncheon. I hope you will present my compliments to your members and say that it seems to me the defense program outlined by the United States government will need as its first requirement the services of engineers of all sorts. May I make the suggestion that a full list of your members be filed with each governmental agency describing each members activity in the past in order that this vast reservoir of engineering talent may be more easily tapped to the advantage of the whole country. In fact this record might be filed with our major industrial activities not as a promotional or commercial idea but for purely patriotic purposes.

(Signed) M. S. TREMAINE,
State Comptroller."

At the business sessions the following symposium topics were discussed:

1. The need of the National Society of Professional Engineers—discussion led by Professor John Chas. Riedel, President of the National Society and past president of our Society.
2. New Fields for the Engineers—discussion led by Engineer Jacob Mark, substituting for Commissioner Arthur V. Sheridan, who was ill.
3. The Activities and Problems of County Chapters—discussion led by Engineer Michael D. McDonald, President of Erie County Chapter.

Interesting and illuminating reports were submitted and discussed by:

Engr. Herman F. Lame, Chairman of the Legislative Committee;
Engr. Charles W. Burke, Chairman of the Membership Committee;
Engr. George A. Dorfman, Chairman of the Publicity Committee;
Engr. David B. Steinman, Chairman of Ethics and Practice Committee;
Engr. Louis Davidson, Chairman of the Patent Committee;
Engr. Joseph B. Diamond, Chairman of the Legal Committee;
Engr. James F. Fairman, Chairman of Special Committee on Civil Service.

GEORGE A. DORFMAN, *Chairman,*
Publicity Committee.

Committee Reports

Committee reports were given as follows:

THE LEGISLATIVE COMMITTEE

Engineer Herman F. Lame, Chairman of the Legislative Committee, submitted verbal supplementary report as follows:

I have no comment to make on the written report which each of you have received except to supplement it with a report on the action of my Committee who met this afternoon in order to formulate some recommendations for future legislation.

We have been through the entire program and have weighed the various bills which were introduced in the last legislation session and not passed, in their order of importance.

It was the thought of the Committee that it might be a good idea to suggest to this body that the order of importance of legislation be left to the judgment of the Committee, and to permit the Committee to decide whether a bill should or should not be introduced in the Legislature next year. Inasmuch as there are many factors that have direct bearing on the success of the program, the Committee feels that if we start with one or two of the bills of importance, as determined by them, and add to these bills as we progress them through the Session, we may have better results to report at the end of the Session. The Committee has catalogued the importance of the bills sponsored by this Society in the last Legislature subsequently as follows:

1. The bill which mandates the use of the seal and charges public officers and Agencies with observation of the requirements for acceptance of engineering plans, specifications, documents, etc. for filing and recording. That bill the Committee felt was the important bill and should head the list.
2. Bill requiring Officers and Agencies to cooperate with the Board of Regents in administration, execution and enforcement of law.
3. The bill which inserts "city and regional planning" "lands or waters" and deletes from definition "wherein the safeguarding of life, health or property is concerned or involved."
4. Bill which redefines practice of "land surveyor" and substitutes "measures" for "surveys" and adds third dimension surveys.

5. Bill which repeats the requirements of Section 1461 of our law into the General Corporation Law.
6. The bill which requires the Board of Regents to appoint a non-member Engineer as Secretary of the Board of Examiners.
7. Bill which amends the Civil Practice Act in relation to fees for Land Surveyors and Assistants and Commissioners in Dower.
8. Bill which provides for two stage examination and partial registration of those who passed preliminary examinations.

In regard to No. 7 on the list, Engineer James Fouhy, a member of the Committee, suggests and has been designated to take this bill up with the Surrogates as to whether or not the Surrogates will back the bill as drawn. If the Surrogates' favor the suggested legislation, the Legislative Committee will suggest that the Surrogate introduce and sponsor it.

In connection with the bill calling for preliminary examination, I think it has been explained before that the introduction of this bill had a very good reaction from the Education Department who want an opportunity to study the intent of the bill and to suggest possibly other means of securing the objective without legislation. For this reason it is the recommendation of this Committee that the two stage examination bill be laid aside for the forthcoming year.

MEMBERSHIP COMMITTEE

Engineer C. W. Burke of Kings County Chapter, Chairman of the State Membership Committee, presented his report as written and made the following supplementary remarks:

The report in itself is complete and since the report was written, another County Chapter has been added to the list of County Chapters in this Society. The Committee wants to take credit for what it does, but this County Chapter, newly formed, is the Ulster County Chapter, which was reorganized by the President and not by the Membership Committee. We are grateful to the President and very happy at this time to announce the new reorganization of Ulster County Chapter.

ETHICS & PRACTICE COMMITTEE

The written report of the Ethics & Practice Committee was supplemented by the following remarks of its Chairman, Engineer D. B. Steinman:

In reference to the man mentioned in my report who offered to sell licenses and did sell licenses, I wish to report that this man has skipped the State of New York and is believed to be in the State of Texas. I mention this so that the information may be passed through the National Society to the State Society of Texas.

In connection with the case of a man who designed a structure which failed and who did not have a professional engineer's license, I wish to report that I have secured further information that this man has testified in court that he was not licensed and did personally design the structure. This information has been passed on to Mr. C. Everts Mangan with a request that a full investigation be made by the Department of Education.

PATENT COMMITTEE

The written report of the Patent Committee, having been distributed to all members of the executive Board, was placed before the Board for their consideration.

LEGAL COMMITTEE

The written report of the Legal Committee and the separate report of the Chairman of that Committee, acting as Counsel for the Society in the matter of the Human Engineering Laboratory, Inc., was placed before the Board for their consideration. An explanation was made by the Chair in the absence of the Chairman of the Legal Committee as to the procedure already taken by Counsel and its results.

CITY PLANNING COMMITTEE

The written report of the City Planning Committee, distributed to all members of the Executive Board, was placed before the Board for consideration.

PRESIDENT'S REPORT

The President's report, as presented in writing to all members of the Board, was taken up for consideration. The President supplemented his report with the following remarks:

I wish to make an intermediate or supplementary report concerning the Year Book. The publishers have furnished me with intermediate report in which they indicate that they now have in their possession or in process of closing, contracts for approximately fourteen (14) pages of advertising in the Year Book. They report that they have four salesmen in the field, which number is to be increased to ten (10) at an early date. The publishers are very enthusiastic on the possible success of the book and, after feeling out the field, they believe they are going to make some real money on it and if they do, as you know, the State Society also will have some money income from the book.

Texas Adds a New Chapter

The Texas Society of Professional Engineers added a third local chapter to its roster, on May 31, 1940, when sixty professional engineers from the Beaumont area, including Beaumont, Port Arthur, Orange, Jasper, Newton and Liberty, met at Beaumont to complete the organization of the Sabine Chapter.

The organization was the result of active work by Engineers Ben Shipley, C. L. Davidson and Joseph Beck of Beaumont and is to be directed in its first year of activity by Engineer T. E. Huffman, District Engineer of Texas Highway District No. 20, who was elected president at the first meeting.

The other officers elected included R. C. Black of Beaumont, first vice-president, O. B. Hartzog, of Port Arthur, second vice-president and R. B. Cruise of Beaumont, Secretary-Treasurer.

Engineer Walter E. Seaholm, President of the Texas Society, Engineer T. B. Warden, President of the Travis Chapter, Engineer R. S. Guinn, Secretary-Treasurer of the Texas Society, Engineers Fred E. Smith, Charles P. McKnight, and E. G. Pierce of Houston and Engineer D. V. Purington of Austin were present to assist in the formation of the new chapter and to welcome it into the Texas Society.

D. V. PURINGTON.

Congratulations

Dr. F. W. Green, Chief Operating Officer of the St. Louis Southwestern Railway Lines, St. Louis, Missouri, has recently been given the honorary degree of Doctor of Engineering by the University of Missouri School of Mines and Metallurgy.

Doctor Green is a member of the Missouri Society of Professional Engineers and the National Society of Professional Engineers. Congratulations Doctor Green!

Resolutions Adopted at New York State Society Convention

May 24 and 25 at the Hotel Commodore

RESOLUTION NO. 1

WHEREAS, the highway system of the Nation is becoming an increasingly important factor in any national defense program; and

WHEREAS, highways have an increasingly important function in the educational system of the State by virtue of the development of central schools and the consequent problems of the safe and expeditious transportation of children; and

WHEREAS, highway transportation is one of New York State's most important industries, contributing greatly to the agricultural, industrial, commercial and recreational development of the State; and

WHEREAS, the report of the State Superintendent of Public Works and of the fact finding committees of the legislature show that the average useful life of a state highway is 25 years and that a minimum of $50,000,000 per year is needed to properly maintain and modernize the state's 14,000 mile highway system; and

WHEREAS, many accidents causing death and serious injury have been traced to faulty maintenance, design and construction of these highways and bridges; and

WHEREAS, during the past ten years New York State, by failing to provide appropriations for an adequate highway program, has fallen from first rank in highway facilities to a place below that of many neighboring states, and

WHEREAS, rational, sound, long term planning and the construction of a safe, modern and adequate system of highways depends upon continued appropriation of sufficient funds over a period of several years by the State Legislature,

NOW, THEREFORE, BE IT RESOLVED, that the New York State Society of Professional Engineers, Inc., go on record as favoring:

1. An increased appropriation for highways and bridges which will protect the investment already made in such facilities and provide improvements to meet modern needs.

2. A highway appropriation for 1941 substantially in accordance with the $50,000,000 recommended by the State Superintendent of Public Works.

3. A state-wide highway planning survey and the formulation of a ten year program of highway construction and reconstruction, and

BE IT FURTHER RESOLVED, that copies of these resolutions be circulated by mail and through the press and brought to the attention of elected officials and the public in general.

RESOLUTION NO. 2

WHEREAS, Groups of citizens proposing to form local water or sanitary districts have, in certain instances, encouraged engineers to make plans and estimates for and to promote the formation and financing of such districts for fees contingent upon the successful financing of the project or upon other uncertain conditions, and

WHEREAS, This practice militates against the detailed and mature consideration which is essential to sound engineering and may lead to situations which are unfortunate for the project and which may bring the engineering profession into disrepute,

BE IT RESOLVED, That the County Chapters of the New York State Society of Professional Engineers, Inc. are urged to investigate this practice among the members of this Society and other engineers, and to report on remedial measures for consideration at the Fall meeting.

RESOLUTION NO. 3

WHEREAS, certain manufacturers, contractors and individuals are performing directly or indirectly, the function of engineers in connection with the sale and installation of particular products in the use of which they have an interest, and

WHEREAS, certain practices result in the evasion of the intent of the Professional Engineers' Licensing Law by failing to provide for the proper and unbiased review of structural features related to the safeguarding of life, health and property, and

WHEREAS, most of these concerns continue this practice believing that it is necessary to enable them to meet competition, and

WHEREAS, these groups might prefer to render only those services pertinent to their business for the use of their particular product,

THEREFORE, BE IT RESOLVED, that this Convention direct the President of the New York State Society of Professional Engineers, Inc., to arrange a date for a meeting with representatives of manufacturers whose products are used in building and general construction work in New York State for the purpose of promoting better understanding between these manufacturers and the Engineering Profession, and to seek a remedy for undesirable practices, and

BE IT FURTHER RESOLVED, that this Convention direct the President of the New York State Society of Professional Engineers, Inc., to arrange a date for a meeting with the general contractors and the various mechanical and electrical subcontractors doing business in the New York Metropolitan Area for similar purposes, and

BE IT FURTHER RESOLVED, that the President of this Society appoint a Committee to make arrangements for these meetings.

RESOLUTION NO. 4

WHEREAS, there is at present no definite prefix designation for the licensed Professional Engineer in New York State, or in the Nation as a whole—such "Dr" which is the recognized abbreviation for a doctor of medicine, and

WHEREAS, in European countries the Professional Engineer is addressed with the prefix "Ing" and

WHEREAS, at present the following designations are being used in this state—"Er"—"Eng"—"En"—"Engr"—Engineer and P. E., and

WHEREAS, we believe it important that a uniform prefix be adopted so that there be no confusion in the use of the prefix to designate the Professional Engineer,

IT IS THEREFORE MOVED, that a Committee be appointed to investigate this subject and this Committee, after proper study and investigation report back to this body with a recommendation for a prefix to be used by the State Society and to recommend to the proper channels to the National Society the adoption of such a prefix.

The other resolution adopted, was the appropriation of funds by the Society for cataloguing its members in order that the services of trained professional engineers of recognized standing as attested by their licensure by the State of New York may be made promptly available in any emergency for the defense of the United States Government.

GEORGE A. DORFMAN, *Chairman,*
Publicity Committee.

The Engineer in National Defense

By Rear Admiral Ralph Whitman
Corps of Civil Engineers, U. S. Navy

An address presented at the New York State Society Convention

The subject of my remarks is "The Engineer in National Defense."

Considering the topic and in view of conditions as they are today it may be that you anticipate from me a discussion of the engineering aspect of the current hostilities in Europe now occupying the attention of the entire world. Let me at the outset correct any such impression.

The daily press is full of reports. Radio news broadcasts are replete with similar reports and with comment on them. Commentators are prolific in their discussions. The gathering of the news is remarkable in its scope. Comments in the main are ably prepared and effectively presented in the light of such information as is available from day to day, almost from hour to hour. Undoubtedly we have more complete news than the people of any one country directly concerned. I suppose that hardly any other country in the world has as full news and as much interpretation of that news, as we in the United States.

I have no intention of paralleling all this with any offering of my own. I could only use such facts as are already equally available to all of you. Anything like a critique would take vastly more time than is available here and would be entirely out of place even if I were prepared to make it.

Let me suggest that, however voluminous the news and the comment on it, we accept all of it with caution. The factual basis is bound to be fragmentary. It is admittedly so. We cannot know the objectives of the various high commands. Without knowing them it is impossible to evaluate apparent accomplishments or apparent failures. All action has a background of strategy and international policy of which it is impossible that we should have any sufficient appreciation. The news that comes to us is a scrambled collection of reports on day-to-day incidents with minor tactical happenings indiscriminately mixed with larger events. What we get is some of the pieces of a gigantic jig-saw puzzle with a great many pieces missing. And the pieces that we have are not to the same scale. Also they are not in their true colors but are colored by the interests furnishing them. We cannot hope to put them together to form the complete picture. An intelligent interest in affairs calls upon us to give attention to what we get, to appreciate the significance of it all, but to realize the limitations of it. It is well for us not to fix our minds upon incidents but upon trends.

What I have to offer you today is not sensational. In comparison with the daily news it is prosaic. I am not even sure that I shall give you information. What I hope to do is to marshall some basic facts and considerations and present them in a concise way, to stow away in your minds if you will, and to do your own thinking about them, each of you in his own way. My remarks will be general, without application to any particular situation. The application I leave to you, both with respect to any situation in which our country may find itself and with respect to your own personal cases. As an engineer I realize the breadth of the engineering field and appreciate that the company here represents a great many aspects of engineering. This makes it all the more desirable that I confine myself to general rather than to specific matters.

Also, I shall make no discussion of military field engineering. That is a profession in itself. It would be futile to go into it here. I am not delivering a lecture on military engineering and I shall stop short of any tactical features. In national defense there is important work for the engineer with troops but there is also ample field for the engineer other than the combat area. There is work behind the fighting front, work that can be done by engineers in uniform or out of it, by engineers no longer of military age or perhaps having some minor physical disability that disqualifies them for so-called military service. Therefore I address myself to all.

Modern warfare is conducted by the nation as a whole. Time was when war was waged by a noble, a king or other leader for the attainment of his own ends, which were commonly pecuniary or to serve individual ambition or personal animus. As a rule the objectives were limited. Operations were conducted mainly by professional men-at-arms frequently foreign mercenaries. Often the bulk of the population was hardly aware of the war except through the increases in taxes. Armies were relatively small and were subsisted largely off the country where they happened to be. Weapons were simple and the problem of munitions hardly manifested itself. Communication was poor, interests were local, and a military decision had relatively small effect on any but the parties to the combat.

The case today is very different. While there may be personal ambition in the minds of some leaders, even those of greatest power are dependent upon the support of a great preponderance of the population. Without that support no leader can carry on. Military forces are vastly larger. Modern implements of war require vast quantities of materials, made especially for their use. The effectiveness of the forces in actual combat depends vitally upon the adequate and continuous supply of those materials as well as of the more ordinary materials of subsistence. The procurement and transportation of this supply is known in military parlance as logistics.

In the defense of our nation, the engineering profession is concerned very largely with the logistics of the war.

For present purposes I shall divide these logistic problems into three classes—procurement, transportation, and distribution. These headings ramify indefinitely and I shall have to reduce them to lowest terms to avoid confusion and keep my remarks within reasonable limit.

Procurement

Procurement includes the obtaining of raw materials, the fabrication of them into the innumerable items required, the assembly of them into complete mechanisms, or otherwise preparing them for transportation and distribution.

Many of these items are so special that they are not used in peace, or if used at all are not used in any such quantities as are required in war. In war tremendous quantities are required. Reserve stocks accumulated in peace time are vitally important for the initial stages of the hostilities, but by no possibility could reserve stocks sufficient for any great length of time be accumulated in advance. A continuous flow of production is necessary and this production must exceed very greatly the capacity of peace time. About all that we can expect from reserve stocks is that they will last until production can be increased to keep pace with consumption.

The war not only occasions a superdemand for some materials. Simultaneously the demand for certain other commodities drops greatly or entirely disappears for the time being.

This combination of circumstances causes a great dislocation of industry. Certain kinds of plant are wholly inadequate for the new conditions. Certain others are almost thrown out of employment. Whole communities are affected. Some trades are tremendously undermanned. Others have very little work or none at all. Some plants are capable of being converted to make a different product. Some are not. Power demands increase practically everywhere. Housing requirements change in different localities. Water supply and sewerage systems have different loads. Passenger transportation problems are different and in most cases more difficult. Even the food habits of the population change. And it all happens fast.

The demand upon the engineering profession under these circumstances is obvious.

With this brief hint as to the production element let us proceed to

Transportation

Under the new conditions the whole transportation requirements of the country are rearranged. Influx of certain raw materials to established centres of manufacture and processing increases. Transportation to new points of manufacture are required almost over night. Warehouse and stock-pile requirements are greatly augmented The increase in production calls for immediate removal of the manufactured products from the place of manufacture. This removal is to points of concentration of supplies. The routes are along lines from the various points of manufacture to certain focal points of transshipment for distribution, ultimately for distribution to points of use or consumption. Rolling stock and motive power become taxed to the limit. Arterial highways become inadequate. Congestion once started pyramids itself with almost unimaginable rapidity.

Distribution

Once assembled at focal points the task of distribution begins, or rather the task of transportation to points of distribution. If water transportation is involved waterfront railheads and the classification yards behind them are called on to handle unprecedented quantities. Here again congestion is a critical threat. In many cases shipments must be complete to be of any use at all. Part of an assembly is of no use. Sailing dates must be met even though only for coastwise voyages. Cargoes must be stowed so as to be available for discharge at the proper points. Material to be discharged at a first stop might about as well not be on board, perhaps better not, if it is in an inaccessible hold reached last in the itinerary of the ship.

The Engineer

Where does the engineer appear in all this? The answer in some aspects of the problem is obvious. Where an engineer's peace time employment is in line with the increased activities it is clear. But what of the others? Obviously there will be dislocations in the engineering field. Some activities and some businesses will be badly disrupted or discontinued altogether.

But the engineer has his important usefulness notwithstanding. It grows out of his intelligence, his training and those qualities developed by the practice of his profession. In fact it grows out of those qualities that led him to become an engineer. He is accustomed to analyzing a problem. He is by nature orderly and logical. He can reach a sound conclusion quickly. He is fertile in expedients. If the regular procedure or regular design cannot be followed he can think of a satisfactory substitute. He is not easily flustered. He directs his efforts at the object to be accomplished. These qualities are invaluable in times of emergency. In such times the engineer's habit of mind will find a most useful application. The opportunity is almost limitless.

And now let me add a more personal word, addressed to you not as a body but as individuals and particularly to the younger man. The picture I have drawn is not a rosy one. It suggests the possibility of conditions approaching the chaotic. But they need not become chaotic. I believe that the engineering profession can attack a situation better if it knows the problem and I have endeavored to present a little piece of the problem. What is needed is steadiness and I believe that the engineer is preeminently steady. Patriotism is a basic requirement and with it goes patriotic enthusiasm. Enthusiasm is an attribute of the spirit. It is like the spark in an automobile cylinder. Without it nothing moves. But it must be applied with discretion. At the right time and in the right place. To the young man of enthusiastic temperament I would say—Don't let your misuse of the spark run your battery down. Save your voltage for its effective use. See that your timer is right and confine your spark to the spark-plug. Bear in mind that a spark in the gas tank does no one any good. Have your enthusiasm controlled and directed. You will last longer that way and be more useful.

One more thing. Efficiency. We hear a lot about efficiency. In connection with human endeavor I like better the word effectiveness.

The efficiency in an electric generator is the ratio of the energy delivered by the unit to the energy supplied to it. In human endeavor it seems to me that it is the relation between what we give the world and what we get from it. Unlike mechanical efficiency it can exceed 100%. In fact it should. If a man gives the world less than he receives from it, what is the excuse for his existence? Apply this to our country and you have my conception of patriotism which is another name for good citizenship. Particularly, apply it to our country in a crisis. No one wants to see the country at war. Short of compulsion we shall not be in a war. But if war comes, see to it that it be as short as possible consistently with a right conclusion of it, and to that end give the best that is in you, always. Our country and its institutions are worth it.

President's Address Before the New York State Society Convention

At the Hotel Commodore, May 24 and 25, 1940

By FREDERICK H. ZURMUHLEN, *Re-elected*

Needless to say, as President of your Society, I consider it a privilege and a pleasure to be afforded the opportunity to address the membership and their guests at this, our Thirteenth Annual Convention. It is a privilege because during the year you have heard much from me, both by word of mouth and by communications. It is distinctive to address this gathering because there are represented in it all branches of the engineering profession, coming from localities in which all forms of industrial, economic, social and political life exists.

One of the cardinal principles upon which this society was conceived and is organized has become something of a by-word, the solidarity of our profession. By it we mean that while it is recognized that the technical problems of the many branches of professional engineering though depending upon the same basic laws of mathematics and the physical sciences, are divergent, it is also recognized and equally true that the professional economic, social and political problems of these divergent branches are alike.

As a profession, individually and collectively, we have a duty of service, not only to ourselves and our profession, but more so to society, to the civilization in which we live and for which we are as a profession so much responsible. That duty of service has never before been so plainly indicated. The unmistakable signs of the times point to the very definite conclusion that the decades ahead will offer us potentialities for service to society of a quality and scope hitherto undreamed of.

Engineers, as a technical group, have done more than their share in the development of the civilization in which we live, particularly have they done their share in the development of the past half-century in the so-called "machine age." Our contribution has been a material one. During the period of prosperity, the engineer has complacently gone above his chosen task of faithfully serving his employer or client. Busy with his technological developments and operation, the engineer has left in the hands of others the social, economic and political activities of his community, state and nation. Some have attributed this shortsightedness on the part of the profession to a lack of training in the humanities. Others, highly satisfied with themselves and discarding the indisputable fact that even engineers are members of society before they are engineers, attribute it to the all-absorbing nature and intensive application necessary for the successful practice of their chosen tasks. Whatever the cause, the effect has been a discrediting of engineering as a profession and the accusation that the accomplishments of the engineer has become a "frankenstein," ready to devour those for whose benefit it was created.

It is evident that the remedy lies with us. The members of our profession, probably more than any other group, are trained in mental discipline, in analytical thinking that is so necessary in choosing the proper path after the facts are known. Our profession deals so largely in factual data, mathematical exactness and scientific truth that we have in a way unwittingly developed a bias against those things in life that are inaccurate and non-logical but, gentlemen, God knows the greatest part of life, in general, is anything but accurate, often inaccurate and mostly illogical. This bias on our part has often acted as a preventive or an obstacle to the acquisition of that philosophy of life so very essential if we are to live, work and assume leadership in a world constituted as it is. Fortunately, however, some fourteen years ago a sufficient number of members of our profession, particularly in this State, recognized the condition and took steps to remedy it. I speak of those of our members and past officers, many of whom are with us today as they are on all occasions of the State Society. These men planted the seed of professional consciousness until today the engineer realizes that it is suicidal to concentrate on the subject in which he has specialized to the extent that he has no time to contribute to the advancement of the general welfare of the Society of which he is a member. He realizes that he must assume the directorship of that civilization, the physical aspects of which he has been so responsible for. He realizes that he has a developed knowledge of necessity for investigation, experiments, tests, etc., and that by his education and training, he has developed the highest of professional common-sense which makes possible sound and analytical judgment, true vision and practical planning. Heretofore, he has constituted these attributes upon inanimate materials and has left in the hands of others the control of the social, economic and political activities of his community, his state and his nation. The need for his leadership, for his straight-thinking and common sense application of engineering methods is self-evident in this civilization and is openly admitted by others.

Boake Carter, the well-known commentator, analyzing the engineer, describes him first as a builder, but indicts him for not going further than building. He draws the definite conclusion that engineers must be teachers, too. He must accompany his creations with both instructions of how to use and how not to use. In the words of Mr. Carter, and I quote, "The engineer may say, 'that's not my business, I'm just an engineer, not an instructor,' but he must be an instructor. He, the creator, is the only one who knows best the potential evils of his creation. He must be an instructor if the very things he has created are not to destroy him along with everyone else through misuse and ignorance."

The President of the United States, in personal correspondence with a past president of our Society, holds forth definitely that the Engineer's responsibility does not cease with the creation or the enlargement of scientific knowledge. Science has made our present culture possible, therefore our constant purpose should be enlargement of scientific knowledge, but in the promotion of that purpose, we must constantly readjust economic and social

institutions to receive each new increment of engineering in such a manner that the constant purpose will be more smoothly and more fully attained. All professional groups, but especially the engineering profession, is in a position of unusual privilege and corresponding responsibility in this matter of adjustment.

It is our problem to determine how to accomplish this leadership and how to rescue this civilization from the chaos into which it his been led by others. It is to be admitted that the method cannot be an individual one. No engineer, no matter how eminent, no matter how well trained, no matter how well fixed in position or in worldly goods can accomplish this leadership or society's recognition of it. His efforts would be but the voice of one crying in the wilderness. Few would heed him.

In order to accomplish this purpose, there are two things essentially necessary. The first of these is self-analysis. The engineer must get the habit of seeing himself not merely as a technical specialist, but as a citizen, a member of society and a policy determining factor in business as well as in the community. Whether an engineer works for the public or a private industry or is in practice independently, he should do more than echo the views of his employer. He should not be a "yes" man. How to distinguish between loyalty and subservience is often a difficult and sometimes a baffling problem, but that distinction is essential and absolutely necessary before anyone can assume leadership.

Given development of a self-respecting judgment as well as a social philosophy, there is another step the engineer has taken and must develop to its fullest potentiality. In our profession, the greater majority are employed and being employed must, on many occasions, take orders. Our professional standards require integrity and judgment and sometimes come in conflict with those orders. The engineer, when this happens, cannot resign for he is more and more dependent upon his job. Our problem then is "how can the engineer maintain his professional standards, how can he maintain his position as an independent citizen, as a man of self-respecting and independent judgment and as a potential leader in society?" Gentlemen, the engineer must maintain that position in most part by professional organization, by the united effort of professional grouping to sustain his professional standards in the public interest and given vitality to the principles and processes of democratic government and to create the medium for the assumption of leadership which, in this day and age, is so sorely needed. The lone individual is largely helpless. Private industrial organizations are, by their very nature, selfish and ruthless in pursuit of their individual objectives. In an organization of professional men, we have the assurance that professional standards and policies will transcend personal interest and will be in the public interest. With a great organization directing the policy under which he works, the engineer may assume professional conviction and leadership. With a great professional organization directing the policies under which he works, the engineer will avoid selfish interests of his own or of his employer. He will attain a matured social philosophy and purpose and will see to it that the general public interest is superior to all others.

Gentlemen, the engineer has a most important part to play. His professional organization is the vehicle to place him in position to assume leadership in this troubled society. That professional organization is our society, the Society of Professional Engineers, organized as it is in county, state and national units. Our society is not organized to obtain technical excellence over other professions or among our own profession. Other technical groups and our colleges are making a good job of that. Our society is organized to foster the professional spirit of the engineer, which can only be fostered by fighting and working together. It is not so important if we have two thousand or a hundred thousand in numbers. Quality with inspiration, not quantity without, is what really counts. It is vital, however, that we professional engineers engaged in private and public work, in industry or in business, have a common militant society through which we can express ourselves. I mean "express ourselves" to further our professional and economic rights, express ourselves for the welfare of our members of all ages and groups, express ourselves for professional solidarity and promotion of the highest professional ethics among the diversified groups who rightfully are members of the profession and lastly, but most important, to express ourselves for the benefit of human society to whom we owe a supreme service if we are worthy of the name, "Professional Men."

Our members must be encouraged to take their places as leaders in their civic, social and political life. Some of our Chapters have already established themselves as most important units of influence in the lives of their communities with great benefit to themselves, to their profession as well as to their communities. Constructive activity along these lines in life is more important than the proficiency in the technical field. Helping others outside the profession helps the public appreciation of our profession. Never miss the opportunity to label yourself as an Engineer, but don't confine you activities and opinions to Engineering problems. Be determined to be the policy maker in your business, your civic and, yes, even in your social and political life. Don't be just a wheel on the vehicle of life, nor only the creator of its complex technology. If you must be a wheel, be the steering wheel.

By a fuller realization of your responsibilities in the profession, by use of your superior training in straight thinking, take your rightful place in this world of ours. Become conscious of your opportunity, join (if you have not already done so), your local Chapter of the Professional Engineers' Society, be active in its work and together, with the professional engineers in your community, in your state and in your nation, lead this civilization to a greater fulfillment of the enjoyment of the many good things in life made possible of creation by the ingenuity and creative genius of the Professional Engineer.

The Engineering Philosophy

(Excerpt from Presidential Address of Dr. Karl T. Compton at the recent Annual Meeting of Society for the Promotion of Engineering Education)

The conviction that Nature is orderly and understandable, the spirit of disinterested curiosity, the passion for truth, the subjecting of hypotheses to the test of irreducible and stubborn facts—these are the elements of *the scientific method*. Along with them go an unwillingness to manipulate truth for the sake of doctrine, a realization that it is impossible to get something for nothing, and that the skillful use of Nature's forces is the way to produce more. *This scientific method has been combined by the engineer with the principle of social utility to form the engineering philosophy, the philosophy of science in action for social purposes.*

Addresses Presented at the Recent Annual Convention of the National Society of Professional Engineers in Columbus, Ohio

Address of Welcome

National Society of Professional Engineers

HAL G. SOURS

Ohio Member, Board of Directors, National Society of Professional Engineers.

Mr. Chairman, delegates and members of the National Society; and members of the Ohio Society and Gentlemen: It is my privilege and distinct pleasure this evening to welcome you to Ohio and wish for you a most successful convention. The Ohio Society, of course, is very glad to have the National Organization honor it by bringing its second annual convention to Ohio in a period of five years. We are also very much honored to have you select Columbus as the city to which you have brought this convention; particularly so in view of the fact that your President, Mr. Ford, is a native of this city.

I might say just a few things in connection with the National society, as well as the Ohio Society. The National Society, like all other professional organizations, has been somewhat gradual and slow in its growth, which perhaps represents a healthy condition. Many organizations which start up with a spontaneous burst or outgrowth do not oftentimes survive. However, this organization has been founded upon firm principles, and that again is an excellent sign of its endurance. Many of the states are now falling in line and seeing the benefits which may be derived from an organization of its kind. My hope is that more of them may do so as time goes on.

I might recount to you a little of the history of the Ohio Society. I presume, of course, that all of our own members are familiar with that history, but those of you who are not of this state might find it of interest to you. The Ohio Society was formed sixty-one years ago. For many years it was made up principally of civil engineers; and of course that means that the other men of the profession took very little interest in the organization. Likewise the various engineer employees of private industry took very little interest in the organization during that period of time. So, in a sense, it was more or less of a closed group, although it was not intended to be such.

One of the things which the old Ohio Society did for many years was to work in the interest of the passage of a Registration Act, which was finally passed and went into effect in 1933. Immediately after that it seems that the engineering profession in this state took on a new lease of life. Shortly after the Act went into effect local organizations or chapters of the Ohio Society began to spring up over the State. Your President, Mr. Ford, was quite influential in forming and helping to form these various organizations and chapters throughout the state. He gave liberally of his time and inspiration. all of which had a lot to do in organizing them on a sound basis. These local societies were primarily interested in their local affairs; not only for the advancement of the profession in their local communities, but to make engineers in the communities; and in many cases, some very excellent results were obtained.

One of the things which these local groups did was to explain and promote, if you please, the intentions and purposes of the Registration Act; and as a result instead of the registration being limited largely to civil engineers and public employees, as many originally thought it would, the interest was aroused in all branches of the profession. Much to the surprise of many of us, the engineers engaged in private industry after a while began to apply in large numbers for registration. So we now have a very large representative group registered in Ohio. As a matter of fact, I think that our last report shows approximately eighty-two hundred registered professional engineers, including the surveyors in this state; which amount, I believe, is second to that recorded registrations in all of the various states.

Now after some time the Ohio Society voted to affiliate with the National Society. That was done. The twenty-seven local societies or chapters are working in cooperation with the Ohio Society or the parent group. We have had some discussion and difficulty at times in trying to get across the idea that the organization should become one organization, all inclusive of the three groups. So progress is being made in this direction and I think eventually that will come.

Now for those of you who belong to the more recent member states of the National Society, I might recite to you a few of the things which the organization has accomplished in the legislative way. Now when I discuss these things I do not mean to speak of them in a boastful manner as something which the Ohio Society has done; but I merely wish to point out to you that you can do just as well as we have done if you handle the problem in the proper manner.

One of the first things which was accomplished was the passage of an act which required that an Ohio engineer, in order to become a candidate for election as County Engineer, be first a registered professional engineer. Prior to that time any one was qualified; elector or voter, and was eligible to that office whether or not he was a registered professional engineer. This bill was passed because of the support given by the professional engineering group.

One of the next things was an amendment to the Registration Act which required engineers of privately owned utilities and public utilities be registered professional engineers. Another thing was the passage of an amendment to our Registration Act which provided that the Registration Board would be able to retain all of its surplus funds in its own treasury. Like many Registration Acts, any surplus of accumulated funds from registration fees after a period of the first three years usually is supposed to be returned to the General Fund of the state with the exception of only a sufficient amount re-

tained for operation. However, the Ohio Board had on account of the increased number of registrations been able to accumulate quite a considerable amount.

It is our feeling that in as much as the engineer's themselves, paid this money in for registration, they are entitled to its use. The amendment which applied to the retention of the funds for the Registration Board Treasury was passed with the understanding and with the agreement that it would be used as long as available to enable us to relieve annual renewal fees; so, Ohio since the beginning of its Registration Act, has never found it necessary to charge its registered professional engineers any renewal fees. We are still operating on the money which they originally paid in at the time their registration was made. We have been successful in opposing and revising Highway Division bills because of the fact that many of the members of this group are interested in highway work; either state, county, or city.

Now some Attorney General opinions have been rendered largely because of the pleas put up by the organization. One of the first ones was an opinion which prohibited any engineer to use the title of engineer in a telephone directory, or any other manner construed as advertising his business as an engineer or professional, unless he is a registered engineer. Another was an opinion which permitted the Board to use the term of "architectural engineer" over which there had been some dispute. Still a further opinion which permitted registered professional engineers to design school buildings over which there was some controversy at that time.

Now undoubtedly many of these would not have been ordered had it not been for the fact that the Ohio Society of Professional Engineers was in a position to extend its influence throughout the state. You know, many members of the Legislature, being confronted with various problems that come before them, are not familiar with the details of our own problem. They undoubtedly are looking for information in most cases, and if people who are their own constituents, or people who are living way back in their sections of the state, if those people are ready to extend influence, such as we have, then they are able to discuss these questions with them.

Now I explain those things to you, as I said in the beginning, largely for the purpose of proving that engineering societies can be a lot of good; not only to themselves, but they can benefit oftentimes the public as well. If we promote the use and the application of sound engineering principles, and if it is restricted to that; the public is going to benefit by it. So much for that.

Now what our attendance at this society convention will be, we do not know. However, it is starting very well. There are now quite a large number of delegates of the various states who are already here in attendance. There are many more who will be expected in tomorrow, and we hope that we may have a most successful convention. Now it is not my part of the program this evening to deliver any kind of a speech. It was my part of the program to welcome you to Ohio, and I want to again say to you that we do indeed most sincerely welcome you here to the State of Ohio and to this Capital City of Columbus. Thank you very much.

Reply to Welcome

National Society of Professional Engineers

J. W. BERETTA

Vice President, National Society of Professional Engineers

Mr. President, Mr. Sours, and delegates: It is indeed a pleasure to be at this meeting, because, although I have been identified with this movement for some time, I have never before had the privilege of attending a National Convention. I have also had to forego many opportunities of attending the National Board of Directors' Meetings. In fact, I have only attended two in the entire time I have been identified with this movement.

However, I was somewhat familiar with this movement through a former association before becoming a member of the Texas Society. I was a member of the New York State Society for about ten years before the Texas Society started, and only withdrew from the New York State Society after the Texas Society was functioning. It has been my pleasure to represent Texas both as a National Director and as a National Vice-President; and I want to say it has been particularly a pleasure to work with your representative from Ohio, Perry T. Ford, who has been one of the great standard bearers in the national movement.

When this national movement began to spread and reach some of the outlying states such as Texas, we were told by those who were assisting in the formation of our different societies of the advantages of the formation of this type of group. It was pointed out that the American Medical Association had become such a great organization and it had become so valuable to its members; and I think it was referred to very rightfully, because it is certainly a magnificent organization and has done for the medical profession what we are now pioneering for in the engineering profession. It was also pointed out that the strength of the various bar associations and the National Bar Association has done great things for the profession of law, has brought the lawyer to the forefront and given him a prominent place in American life. I think that was also rightfully brought out.

However, I have come to see this movement, since being identified with it, as something far greater than that. In my own experiences and my own mind, I have been able to build up, and I hope rightfully so, a very close analogy in this engineering movement to the actual history of our United States of America. I can visualize the thirteen colonies; the war for independence, the thirteen struggling states confederated into the first United States of America; the gradual growth of the federation of the original thirteen states to our great federation of forty-eight states. I wonder if any of you have felt that analogy.

With regard to this, I want to make some comparisons and I want to give you some thoughts to ponder over and to carry away with you. I have had the question put to me many times: "Well, we have had state organizations which have been functioning very well for forty, fifty, or sixty years; why should we bother with this national movement?" I think your Ohio Society is one of the oldest and one of the most successful and has been functioning many many years before our National Society was ever dreamed of. The same is true in many other states. It is not true in my own state; but it is true in Illinois, New York, and many other states. I just wonder if those of you who ask this question as early in the game as this, really have ever stopped to realize that until a strong national organization is built up; until strong national cooperation can be obtained; until strong national membership can be brought up to a peak; until strong national policies can be formed; until then, I just wonder how you really can expect to get very much out of the National Society.

(Continued on page 14)

The American Institute of Electrical Engineers Draft of Model Law

Address by C. C. Knipmeyer, Professor of Electrical Engineering, Rose Polytechnic Institute, Terre Haute, Indiana. Presented at the National Society of Professional Engineers' Convention in Columbus, Ohio

Professor Knipmeyer Is Chairman of the Legal Procedure Committee, National Council of State Boards of Engineering Examiners

The first registration law for professional engineering was drafted in 1907 by Wyoming. In the next twelve years only three more states passed registration laws. But in the next three years seventeen states joined them. In the next thirteen years only seven states were added to the list, but during the past five years, fourteen more followed, making forty-two at present. In the remaining six states the registration movement is quite active.

As early as 1911, it was recognized that, in the interests of justice and cooperative efficiency, the various state registration laws should be as nearly identical as possible, the model to be a composition of the best ideas of all engineering groups in all states. In that year a model law was drafted. A new draft was made in 1915 by a joint committee of six national engineering societies. Other drafts or revisions were made in 1920, 1925, 1929, 1930, 1931, and 1937, with all or nearly all groups of engineers represented in the conferences. The method of striving toward an ideal was as efficient, as democratic, as representative and as conscientious as was humanly possible. Of great help was the National Council of State Boards of Engineering Examiners, organized in 1920 as a coordinating and advisory agency for all the state boards. Quite naturally there were some differences of opinions, but these were fairly argued and settled. Final approval was in most cases unanimous and in all cases nearly so. In the last two meetings the A.I.E.E. representative wished to make certain exemptions not deemed advisable by the other representatives and A.I.E.E. approval to the generally accepted Model Law was not given.

Though the Model Law was framed in the fairest possible way, with the widest representation of interests and a background of extended experience, and is closely woven into the laws of five-sixths of the states of the Union, certain forces in A.I.E.E. moved to independent action. A committee to draft a model law "from the standpoint of the electrical engineer and his activity," to quote the committee chairman, was appointed. Such a committee should have been representative of all electrical engineers, sympathetically, occupationally, and geographically. Instead its membership was made up exclusively of officers of several large New York industrial corporations. They drafted a model law, printed it, and gave it wide distribution.

The A.I.E.E. model law is closely patterned after the generally accepted model law. Its chief difference is clearly aimed to exempt engineers in large organizations, by requiring registration only of engineers who are for public hire. However inexperienced in registration matters, the committee must have known that this attempt at exemption would be unworkable and that its adoption would destroy registration. Is not every engineer, potentially, for public hire? Every man who works, works directly or indirectly for the public. The immediate source of an engineer's pay or the size or character of the organization in which he is found is of no concern in registration classification. No clear cut, sharply defining legal definition could be given to the phrase "for public hire" even if there were any occasion to do so. Members of registration boards know the impracticability of attempts at such classification. In defense of their position, members of the A.I.E.E. committee argue that large industrial corporations find it to their interest to weed out incompetent men, so that question of competence in their organization should not be raised. Other groups might just as well argue likewise. Even an individual might argue that it is to his interest to be a competent engineer, therefore he makes himself so, and therefore his competence should not be questioned. In its first statement of principles the A.I.E.E. committee says: "Legislation of this type is enactable only for the public benefit and should be limited to that objective. Any benefit to the profession should be incidental." In this statement there seems to be an insinuation of selfishness directed towards friends of registration. Yet in the whole registration movement selfishness has made no progress against high idealism until now. Your speaker has enjoyed continuous membership in A.I.E.E. for a third of a century. He knows, and has always known, that A.I.E.E. comprises as fine a group of men as exist anywhere. He knows that there has been conflict between a zealous registration board and certain A.I.E.E. members in New York and that A.I.E.E. and registration and its ideals in forty other states are made to suffer for it. He has the sincerest conviction that if A.I.E.E. had selected a fairly representative registration committee there would be harmony today. It should be well recognized that whatever errors exist in registration will be found and corrected by official representatives of all engineering groups around the council table and that there is no other proper way.

Public welfare and the safeguarding of life, health and property are just as much the concern of the electrical as of any other engineer, whether he be in private or public employ. There are probably quite as many lives lost through electric shock and as much property damage through fires of electrical origin as from failures of bridge and building structures. It is petty to try to make distinctions where basically none exist. Structures, electrical appliances and applications, machines, chemical compounds, and processes, all touch vitally the public welfare. All engineers have public responsibility as professional men—not merely as citizens.

Does the registration law work any undue hardship upon any electrical engineers, or any engineers not for public hire, that would justify revolt and the threat to destroy the good that registration can do? No such hardship is discernable. Would their exemption, in any case, be particularly in the "interests of public welfare?" This, too, is not indicated.

The history and experiences of other professional groups are worthy of closest study on the part of engineers. The licensing of lawyers was found imperative

for the protection of the public. The fact that licensing proved also of benefit to the legal profession itself has never been counted objectionable. Public welfare also demanded the licensing of physicians. This licensing was a godsend to the public and proved a great uplift to the profession.

The public trusted each of these two professional groups of law and medicine to administer its own licensing law with proper regard to public interest. Shortsightedness and failure to completely keep their trust, has already cost the legal profession parts of its field of activity. Judicial procedures have been replaced by arbitration boards in many activities. Administrative boards in many lines are crowding lawyers out. It is to be noted, too, that failure of the medical profession to see fully its responsibilities to the public, particularly to the poor, is resulting in a serious threat of socialized medicine. Physicians can combat this threat only by actively recognizing its public responsibility. It is to be hoped that this recognition is not coming too late. It is a well established fact that no group can remain selfish and continue to retain power and influence long.

Up to the present time the engineer is trusted by the public. He is known to be trained in the fixed laws of nature and into the greatest respect for them. His training is founded in honesty and in the highest ideals of service. He is thoroughly trusted to hold his profession to high standards. The force of law is placed in his hands to do this. It must be done well. The members of his registration boards are awake to this responsibility. Evidence steadily comes to them of fraud, incompetency and violation of ethics. In this age of high pressure fighting for advantage, the engineering profession cannot hope to avoid contamination of evil, without watchfulness and effort. Unity in thought and planning is necessary for this. There should be no disaffection in the family of engineers. The moral and ethical influence of the engineering societies combined with the force of law exercised by registration boards should keep engineering on the high plane where it can render the greatest service and earn the highest respect and trust of the public. The mechanism for achievement is in the engineer's hands. He should make it function smoothly. It is a complete unit. Divided, it would fail. It must be kept complete; then the engineering profession can not only serve civilization in material ways, as it is so abundantly doing, but be most effective and set the finest examples in matters of social organization.

INDIANA ELECTS

Newly elected officers of the Indiana Society of Professional Engineers for 1940-1941 are:

President, M. G. Johnson, 207 City Hall, Indianapolis; 1st Vice-President, Clyde Walb, 2511 Taylor St., Fort Wayne; 2d Vice-President, Asher W. Gray, Wabash; Secretary, James E. Loer, 207 City Hall, Indianapolis; Treasurer, Carl E. Vogelsang, 5218 Kenwood Ave., Indianapolis; National Director, Donald H. Walker, Indiana Service Corporation, Fort Wayne.

Tino J. Poggiani, 215 E. 63d Street, Indianapolis was appointed Executive Secretary and Editor of the *Indiana Professional Engineer.*

ARKANSAS SOCIETY ELECTS OFFICERS

Newly elected officers of the Arkansas Society of Professional Engineers, elected April 6, 1940, are as follows:

President, Leonard N. White, 910 Rector Building, Little Rock, Arkansas; Vice-President, L. R. Parmelee, 216 Perry Street, Helena, Arkansas; 2d Vice-President, Werner C. Knoop, 329 Gazette Bldg., Little Rock, Arkansas; Secretary-Treasurer, Virgil B. Buckley, Room 64, Court House, Little Rock, Arkansas.

Reply to Welcome

(Continued from page 12)

I can imagine that perhaps when the proposition was put up to them to join the struggling federation of the original states, some of the old burgesses of Virginia wondered and perhaps asked the question: "Well, Virginia has had its own government and has been getting along fine; has been prosperous; why should we bother to confederate with other states? What good can we get out of it?" I imagine that the soldiers that suffered through Valley Forge certainly couldn't appreciate that they were getting anything out of the federation that they were fighting for. And in my own State, I don't imagine David Crockett was doing a lot of thinking about what he was getting out of the Republic of Texas while he was in the siege of the Alamo.

What I see in this picture is many many necessary years of effort on this movement that is certainly gaining emphasis and certainly receiving the interest of this fine representative gathering here tonight. I can see the possibility that the engineering profession is going to benefit as greatly as we as citizens of the United States have benefited from our federation of states; and what the medical profession has gained from its National Association; and what the legal profession has gained from its National Association. I can see all of those fruits coming to us.

However, those fruits will not come by themselves. They will not be handed to you. You are going to have to work for them. You are going to have to support them; and you are going to have to put lots in before you can get anything out.

I want to go back once more to my original subject of a response saying that I think this movement that was initiated by Perry Ford to have a National Society Meeting held in conjunction with the Ohio State Society Meeting is one of the finest things that could possibly be done at this stage in the history of this movement. When the first Continental Congress met, it didn't have any Washington to meet in. It had to meet in Philadelphia, Pennsylvania, a place long established as a colony and later as an independent state. I think that the National Society in its young days and its growing days has lots to learn from such a well established, smoothly functioning organization as the Ohio Society of Professional Engineers.

I hope that this movement will spread, Mr. Ford; and I can conceive that this would be a very fine policy, this plan of letting the National Society meet in various states in conjunction with the state meeting. I think it might bring this movement closer together to give the state delegates at their own state meeting a chance to see this national movement in its younger days; a chance to appreciate more of its problems; a chance to realize more and more that it is their movement and that it is their support that is going to put it over.

I hope that sometime in the future Texas will be given an opportunity in conjunction with its own state meeting, to follow this splendid lead of Ohio. I think that with this splendid start, you have given us one of the soundest basis for our future greatness, that is inevitable, and for our future growth that is now really going to take a firm route.

It is indeed a pleasure for me to be here. I appreciate the kind salutation of Hal Sours, and I know that about all that I can express in behalf of all the delegates from other states, is that your hospitality at this meeting will give the other states at later dates, when they also play host to this convention, a high mark to shoot at.

A N N O U N C I N G

the

Sixth Annual Convention

of

THE NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

to be held
jointly with
the

Fifty-sixth Annual Convention

of

THE ILLINOIS SOCIETY OF ENGINEERS

At the Hotel Sherman
CHICAGO, ILLINOIS

January 30 and 31 and February 1, 1941

W. Wayne Wallace
33 West Grand Avenue
Chicago, Illinois

is

Chairman of the Committee on Local Arrangements for the Illinois Society

A general outline of the convention program will be given in a succeeding issue of The American Engineer

A Corporation May Not Practice Engineering

Editor's Note: The following Pennsylvania Supreme Court decision is of extreme importance to all of us.

IN THE SUPREME COURT OF PENNSYLVANIA

Western District

F. F. BOLLINGER COMPANY, a Corporation, v. WIDMANN BREWING CORPORATION,

Appellant.

No. 166, March Term, 1939. Appeal from the Judgment of the Court of Common Pleas of Cambria County, at No. 299 March Term 1936.

OPINION OF THE COURT

Filed: June 24, 1940.

Barnes, J.:

The sole question upon this appeal is whether the violation by the plaintiff corporation of the Acts of Assembly relating to the practice of architecture and of engineering should deprive it of compensation for architectural and engineering services rendered to the defendant.

The F. F. Bollinger Company was incorporated under the laws of this State and specializes in the designing, construction and rehabilitation of breweries. Its president, F. F. Bollinger, has been engaged in that business for many years. On June 1, 1933, the defendant accepted the proposal of the plaintiff corporation to prepare plans and specifications for the rehabilitation of the defendant's brewery buildings at Conemaugh, in Cambria County. It was agreed that the plaintiff should be paid a fee of five per cent of the full cost of such rehabilitation, one-half payable upon completion of the plans and specifications, and the balance when the construction was completed and the brewery ready for operation.

On August 14, 1933, the completed plans and specifications were tendered to the defendant, but the latter was unable to make the payment agreed upon and endeavored to persuade the plaintiff to extend credit. The plaintiff finally permitted the defendant to use some of the drawings upon the payment of $500 on account, to assist it in obtaining necessary financing for the project. In these efforts, however, the defendant was unsuccessful and the brewery has not been made ready for operation. For more than a year the plaintiff's demands for payment were ignored, but on August 17, 1934, the defendant promised to meet them "as soon as possible."

In this action of assumpsit the plaintiff claims the sum of $3,250, which is one-half of five per cent of the estimated cost of rehabilitation of $150,000, less $500 paid on account. The defendant filed an affidavit of defense alleging that the plans were not completed within the time fixed by the parties, and that the contract was not properly authorized. The case went to trial upon these issues.

In the course of the trial, the defendant objected to the introduction in evidence of the plans prepared by the plaintiff upon the ground that they were in violation of the Act of July 12, 1919, P. L. 933, as amended by the Act of April 24, 1933, P. L. 64, regulating the practice of architecture, and also of the Act of May 6, 1927, P. L. 820, regulating the practice of engineering. On each drawing was the legend: "F. F. BOLLINGER CO. Architects and Engineers," and the signature of F. F. Bollinger with no indication of his capacity. Bollinger testified that he had merely approved the plans as president of the corporation, and that their actual preparation was entrusted to engineers in its employ.

The defendant's motions for a compulsory nonsuit and a directed verdict were refused and the jury awarded to the plaintiff the full amount of its claim. The court in banc dismissed defendant's motions for a new trial and for judgment non obstante veredicto, and this appeal followed. No question affecting the merits is here presented. The sole issue is whether the plaintiff is barred from recovery because of its failure to comply with the Acts of Assembly mentioned.

The Engineering Act of 1927 provides in Section 1 that ". . . it shall be unlawful for any person to practice, or to offer to practice, the profession of engineering . . . unless such person has been duly registered or exempted under the provisions of this act." Section 8 provides that a corporation may practice engineering only in the names of persons associated with it who are registered engineers. Section 14 requires that plans, specifications, plates, and reports issued by a registrant shall be stamped with a seal bearing his name and number and the legend "Registered Professional Engineer." Section 16 imposes penalties for violations of the Act and declares them to be misdemeanors. The statute contains provisions for the creation of a professional registration board and for the examination and supervision by the board of those seeking to practice the profession of engineering. It prescribes the moral and educational qualifications of those entitled to registration. It also provides for the annual renewal of certificates of registration and for the revocation of the certificates of those guilty of fraud, deceit, incompetency or misconduct in their professional activities.

The Architects' Act of 1919, as amended by the Act of 1933, provides for the examination and registration of architects by the State Board of Examiners of Architects. Registration is limited to citizens of good moral character who have completed the prescribed educational courses and have passed the board's examination, or to persons engaged in the practice of architecture prior to the passage of the Act who have submitted evidence to the board of their qualifications. Only those who have registered are entitled to use the designation "registered architect," and the use of the title "architect" is restricted to those previously engaged in the practice of the profession who have filed an affidavit to that effect with the board. Section 13, as amended by the Act of 1933, provides: ". . . it shall be unlawful for any person . . . to enter upon the practice of architecture in the State of Pennsylvania, or to hold himself or herself forth as an architect or as a 'registered architect' . . . unless he or she has complied with the provisions of this act . . . This act shall not be construed to prevent persons other than architects . . . from designing buildings and supervising their construction, provided their drawings are signed by the authors with their true appellation as engineer or contractor or builder, or carpenter, but without the use in any form of the title of architect." Section 14 makes violation of the Act a misdemeanor, and prescribes penalties therefor.

Although the plaintiff engages in some construction work and might, we have seen, perform architectural services incidental to such work, it is clear that it can do so only in the manner provided by the legislature. As a corporation it cannot qualify as an "engineer" or "architect" under these statutes, nor may it lawfully describe and hold itself forth as either engineer or architect. Yet it did so in the present case, not only in the legend appearing on the plans, but in its letter to the defendant of June 3, 1933, which opens with the following acknowledgment: "We have received your approval and accept-

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Registration and Engineering Schools

By **DR. ROBERT GOWDY**

Dean, College of Engineering and Commerce, University of Cincinnati

Presented at N. S. P. E. Convention in Columbus

Registration of professional engineers, increased activity of engineering societies, the accelerated pace of technical advance, the realization of the social responsibility of the engineer, are all expressions of a growing professional consciousness. It is obvious that all expressions of this consciousness react trongly on professional training, though it may not be possible to separate precisely their specific effects. To limit a discussion only to the effect of registration on educational programs would be difficult and unprofitable.

From the point of view of educational policies it is important to separate purpose from procedure. If the registration of engineers had been originated to create a limited aristocracy with special privilege nothing could be said in its favor, and it would have been vigorously opposed by all educational interests. But the purpose of the movement has been to achieve a general betterment of the profession and among men who by training and experience have developed the habit of careful weighing and unbiased judgment there is little danger that the powers of registration will be perverted. There can not therefore be any conflict between the aims of registration and those of education; on the contrary, cooperation and coordination between the practicing members of the profession and those who are engaged in training future engineers is necessary and would seem to be spontaneous.

But many spontaneous reactions proceed very slowly in the early stages. In this instance the reaction has been accelerated by a catalyst known as "accrediting," and it is through this procedure that the colleges have felt immediately the effects of a relatively new ingredient.

It is important at this point to note the compressed time-scale on which technology has developed. While one may trace the profession of engineering back to the stone age if the point of ancient lineage must be established it is only an academic point. The fact is that the importance of engineering, however it may be measured, has grown at an unbelievable and continually increasing rate since the beginning of the present century. Comparisons of engineering with law and medicine should not overlook this difference in time derivatives. When changes come about slowly there is time for plastic flow, but a suddenly applied stress may shatter the material.

The desirability of some form of registration is almost universally accepted, though there may be differences of opinion on standards and methods of administration. That there should be some degree of uniformity seems almost necessary if registration is to have general significance and produce improvement in professional status. To be effective it must have some foundation on legal authority. In these facts there lies a serious difficulty, perhaps a danger. Uniformity and legal foundation may tend to produce inflexibility and fixation and the engineering profession is not yet ready to set in the forms. Adequate requirements for a doctor or lawyer can be written at the present time with at least temporary confidence but an acceptable definition of an engineer has not appeared. Yet the necessity for action may easily lead to premature and constrained solidification.

If the need for definiteness in the registration program is transmitted through the mechanism of accrediting to produce a restriction in the freedom of educational policies, the development of the engineering profession will be inhibited rather than stimulated. But there is a difference between transient definiteness and finality, a distinction which disappears only when growth has ceased, a condition which, happily, has not yet been reached in the engineering profession. In the maintenance and raising of standards the engineering colleges welcome the support which derives from the registration program and from all other evidences of professional improvement. But there is a long history and tradition to uphold the jealous guarding of academic freedom. Between these opposing tendencies there need not be conflict but rather adjustment and balance.

There are certain specific problems which, though they have long existed, have been brought sharply into focus by the developments of recent years. Of these, two seem to be of immediate, almost pressing, interest:

First, registration distinguishes sharply between those who are engineers and those who are not engineers. If this sorting of individuals could be accomplished at an early age by a snap gauge or a photronic cell, no problem would arise. But what happens is that many young men are exposed to some sort of formal education and some show much more development than others. Some go far, others stop in the early stages. If and when an accurate criterion is established it may be possible to say that this one shall be recognized as an engineer but this one is not. If and when that can be done the problem of registration is solved, but in measure as this separation becomes possible educational training receives a new problem. Industry can not operate with a personnel consisting only of top-flight engineers and unskilled labor; it requires all the gradations and in increasing numbers as the intellectual level descends. There is a definite and large demand for technically trained men in the lower levels of ability. Yet, if the rising standards of the profession force the colleges to raise the entrance and degree hurdles, what is to become of the young men of limited but definite ability? The present practice is to flunk them out somewhere along the line, with an unbalanced fragmentary education and the stigma of failure. Occasionally one of these "failures" becomes president of a large industry and makes discourteous gestures at his former instructors on sight. This is known as the law of compensation; it takes care of the special case but it does not solve the general problem.

Second the engineer, partly in his aspiration towards a place among the learned professions, but mostly as a result of his experience, realizes the narrowness of his training and the consequent limitations of his apperceptive

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Should the Engineer Ignore Civic Affairs

Address by ARTHUR V. SHERIDAN

At the Convention of the National Society of Professional Engineers, Columbus, Ohio

Mr. Chairman, ladies and gentlemen: Permit me at the outset to say that I am very grateful for the interlude which has been made necessary by the broadcasting rearrangement. I have but a few days since arisen from a sick bed where I had been confined with a streptococcus infection accompanied by a quinsy operation. I make this statement in the hope that you will be tolerant. The introduction of the Chairman was such as to justify expectations which I fear will not be fulfilled.

The topic of this address came to my attention within the present week. I do not know who selected it. I do not wish to appear critical. I feel, however, that the subject "Should the Engineer Ignore Civic Affairs" suggests a parallel to the question posed by the attorney who was cross-examining a man accused of having mistreated his wife and who kept insisting "Answer 'yes' or 'no' to the question 'Have you ceased beating your wife'." If I were to suggest that the engineer should ignore active participation in civic affairs, I would be counseling him to be other than a good citizen, whereas if I urged him to participate, one might readily draw the inference that he had heretofore not been a good citizen. Under the circumstances, I trust that I may be permitted the liberty of changing somewhat the title noted by treating the same as though it were "Should the Engineer Take a Greater Interest Than He Has Heretofore in Civic Affairs."

It seems to me that this subject might be discussed from three separate, but overlapping, viewpoints;—first, that of a citizen; secondly, that of a professional man; and finally, that of an engineer. Surely, as a citizen, neither the engineer nor any other should refrain from active participation in civic affairs. The man who does so forfeits, in spirit, his right to citizenship. The engineer, in common with the rest of mankind, is first of all a citizen and has his obligations as such. He must subordinate his professional and his technical viewpoints to the larger perspectives of civilization and society. On this issue, I think there can be no room for difference of opinion and I shall not attempt to elaborate further.

The second angle from which this subject might be considered is that of a professional man. This predicates the assumption that the engineer *is* a professional man. The only standard which receives recognition from public official and court of law is that which prevails in some forty-two states, namely, the possession of credentials indicating that investigation and examination here have revealed justification for granting to the individual, by the state, a license which entitles him to term himself an engineer and to engage in the practice of a calling, the prosecution of which vitally concerns the welfare and interests of the state which must assume the responsibility for safeguarding the life, health and property of its citizens. Under such circumstances, it is unquestionably justifiable to contend that the engineer is a professional man, and, in common with other professional persons recognized by law, must accept not alone his opportunities but his share of obligations. Every professional man who has been certified by his state is, in a sense, an agent of that state and, as such, it is his moral, as well as his legal obligation to place the public interest above even professional and personal considerations. The man who does not so regard the purport of the license which has been granted to him does not justify the trust which has been reposed in him. Active participation in civic affairs is a sine qua non of the fulfillment of the engineer's role as a professional man.

The third argument that enters into this discussion concerns the engineer directly. The social fabric in which the engineer finds himself is that of his fellow man, and, he cannot hope to secure a recognition and a social status to which he believes himself entitled, unless he makes himself known by playing in full his part as a member of the community, the state and the nation to which he belongs. Furthermore, it must be recognized that only through the establishment of respect for the profession can the individual hope to secure the reward to which he, as an individual, aspires.

To touch on the more positive side of this subject, may I direct your attention to the fact that the engineer has consistently been attacked, over a period of years, and has been accused of being largely, if not almost entirely, responsible for the breakdown of civilization during the last decade. His defense has come not so much from the profession as from distinguished personages outside the calling who have manifested the vision and the understanding to plead, not for him but with him, for a more active role in the affairs of society. It is time that the engineer, himself, demonstrated his ability to command the respect of others and to compel attention to his arguments. These should be proposals,—not defensive pleas. He has been responsible for the mechanized civilization in which we find ourselves. Admittedly, it is not the finest of all conceivable civilizations; it is unquestionably too material to be so. Nevertheless, the engineer has been its principle author. The charge, however, that has been leveled against him is not justified. While he has played the principal role in developing that civilization, he has had practically no part in administering the same. Common sense suggests that the creator or author of a machine is the best man to repair or correct the same when the said machine fails to function. Accepting such reasoning, it is fair to contend that he who has done so much toward the development of civilization should be permitted to play a more important role in the efforts to restore it to an even keel. Today, after some ten or twelve years, the economists and sociologists, who were so largely responsible for the catastrophy of the last decade are again proposing without blush, in fact with the same positiveness as in the nineteenth and early twentieth centuries, panaceas predicated on premises equally as unsound as those which prevailed prior to the present depression. Instead of employing the methods of real scientists in their efforts to solve the problems which beset mankind, the sociologist and economist are again riding hard with new and entirely unproven theories. Like the Bourbons, they have learned nothing. The economic philosophies of such men as Adam Smith, John Stewart Mill, Thomas Malthus, and especially the so-called financial experts of the past one hundred and fifty years, proved to be anything but scientific. The new ones that have come forth recently are just as weak in their

premises as were their forerunners. The exponents of social philosophies are growing more and more insistent in enunciating the same as "social sciences"(?). They still fail to recognize that there is no such thing as a universal social outlook; one which bears the stamp of approval from the Chinaman, the Scandinavian, the Teuton, the Latin and the American alike. These peoples are not, and probably never will be, alike in their viewpoints and aspirations. Despite this undebatable fact, the proponents of new theories proceed to make a number of experiments which may afford a majority of concurrences (coincidentally or accidentally) upon which they unhesitatingly predicate new theories and doctrines, —give them the blessing of the term "science" and formulate and preach the same as though they were dealing with principles as inviolate as the laws of nature with which the scientist and the engineer have at least a decent acquaintance. These theories and doctrines, as pernicious and lacking in the recognition of the fundamental concepts of science as were their predecessors, can eventuate only in an unsatisfactory state of affairs if allowed to take root.

The difference between the reasoning of the scientist and the engineer, as compared with that of the sociologist and the economist, is something which the welfare of mankind demands be brought vividly to the attention of society. Each professes to use a scientific method. The engineer verifies, retraces and demonstrates every step he takes. He justifies his endeavors from premises to conclusion. He is well nigh certain of what his results will be at every stage. He does not suggest that one make a number of experiments or take a number of samples and then enunciate the prevailing evidence as a definite law. The laws used by engineers and scientists are infallible. On the other hand, the sociologist and the economist unhesitatingly accept a consensus as justification for promulgating a principle clothed with all the authority of a natural law. It is for this reason that so little progress has been made outside of the development of the material things of life. It is not, as is so often stated, that experiments and investigations in fields other than the physical and material have been neglected. On the contrary, they are countless in years and in numbers. The sociologist, the economist and the psychologist have a history as old as that of the scientist and the engineer. Unquestionably, their problems are more difficult and perhaps incapable of solution by man. One thing seems certain,—man cannot produce social equilibrium by applying physical laws to society, or by attempting to make a science out of human opinions. Civilization, if it is to progress, demands that he, who is best able to distinguish between that which is true science and that which is opinion, or at best a philosophy, lend himself more actively to the consideration of those phases of civilization which have lagged behind. This is obviously the engineer's opportunity as well as his responsibility. However, in entering the field of sociology or economics, the engineer must be careful to distinguish between the properties of the matter he has heretofore been dealing with, which are so universal in reaction, and those of the human beings who are the concern of his new venture and whose reactions are never universal,—in fact are invariably unique. The application of definite universal principles to human beings will prove equally as unsatisfactory as have the attempts to formulate a science from a consensus or a prevalence of opinion concerning human nature. Clothing unprovable opinions with the cloak of science is well nigh certain to produce erroneous conclusions.

If the engineer will interest himself in the affairs of his community and in the activities of such groups as Chambers of Commerce, Rotary Clubs, Boards of Trades and various other agencies he can, by pursuing a policy of definite deliberation before making statements, command the respect and the attention of those organizations through presenting to them social and economic programs for their consideration. He can aid materially the welfare of his community by having his local engineering chapter or society play an active role in those matters which concern the general welfare. There is hardly a city, town or community in this country that has not, at some time, been faced with problems of water supply, sanitation, traffic, and countless other questions which are constantly in the press, the legislature and the public mind. Why should the engineer not play in such matters the role of the physician in the community threatened with a plague?

Every city in the country is at the moment obsessed with the belief that city planning is the panacea for many social, financial and physical ills. Strangely enough, the engineer is playing little or no part in connection with the development of this activity. The average county, city, town or village, would probably be delighted to have a local engineering organization present its professional viewpoint concerning such matters as water supply (I do not mean to give free professional services but rather to discuss policies). It probably would be pleased to have the engineer express himself on most matters of so-called "City Planning." Such activity would have a most salutary influence in maintaining a proper restraint upon the enthusiasts who, though lacking an engineering training and oblivious to problems of execution, believe themselves completely equipped to plan for the rest of mankind physically, as well as socially. The impression prevails generally throughout the country that the engineer is not qualified to be a city planner. Others have so decided. He is said to be lacking in perspective. Available information indicates that not 5% of those who have anything to say about policies in connection with city planning are engineers. The prevailing opinion is that the latter are useful as technicians who can be hired when needed, but who lack breadth and understanding sufficient to justify placing them in positions where they have a voice in the determination of policies.

For a number of years, the professional engineering society has attempted to convince the engineer that in order to obtain that which he dreams of, he must first recognize that in a sense an entire world exists outside of his business life. He cannot ostracize himself and then expect society to come to him offering the role of one leading mankind out of the wilderness. No group will come to the engineer unless he manifests a willingness to go to it. We can expect little consideration from people, generally, unless we command their good will and respect. If the engineer is unwilling to mix with society, then there is no way of convincing the latter of his value as a citizen.

Within recent years, a number of well known persons, including the President of the United States, have made definite statements to the effect that the engineer must assume a role of leadership in the society of tomorrow. If the latter is unwilling to expend time and energy in trying to understand those problems which are not strictly technical,—things with which the community as a whole is concerned,—he surely will not be in a position to assume that leadership. Furthermore, he cannot do so unless he recognizes, as has been previously set forth,

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Enforcement of State Registration Laws

Address by WALTER GRAF

Member of the Ohio State Registration Board, Before the Convention of the National Society of Professional Engineers in Columbus

Chairman Nold, Members of the N.S.P.E., O.S.P.E. and Guests:

I have noted here a few of my observations and ideas after having served as a member of the Ohio Board for the past six years. Ohio has the second largest number of registrants in the United States and should therefore (on a percentage basis) be second in line of enforcement difficulties.

Last year the Committee on Legal Procedure of the National Council of State Boards of Engineering Examiners made a survey, by the questionnaire method, of the enforcement of the registration laws by the several Boards. The returns indicated:

First—That in most cases the complaints were of illegal practice, where registration had never been obtained.

Second—A very considerable number of cases of illegal use of the title "Engineer."

Third—Cases of lapsed registration, violation of professional ethics and violation of laws by registrants were each about five percent of the total complaints.

The sources of complaints were about equally divided as follows:
Registered Engineers.
Engineering Societies.
Board Members or Board Staff.
Less than 10% were from Non-Engineers.

The cases were handled as follows:
By correspondence—Great Bulk.
Only about 10% required hearings.
Less than 5% required legal charges.

The cases were settled in the following ways:
65% agreed to discontinue practice.
11% filed applications for registration.
10% found to be unfounded or not fully sustained.
5% filed applications for reinstatement.
There were NO failures to convict in a court of law.

From a study of the report of the above named committee, it is my opinion that difficulty in enforcement of the law is in direct proportion to the popularity of the law in that state. In the first place a great majority of the Engineers must be sold on the law and then the general public. This can only be done by education. The people must be back of any law if it is to be worth anything. It is an up hill proposition to force something on the people that they are not familiar with or are opposed to. The problem of enforcement will be lessened only as we popularize the law in the various states and popularization can come only through education. The Ohio Board Members never fail to take advantage of every opportunity to discuss our law before any organization, be it Engineering, Technical, Non Technical, Service Clubs or Labor. In my opinion, the greatest asset to the popularization and enforcement of the law in Ohio is the Ohio Society of Professional Engineers thru its 27 Affiliated Societies representing every County in the State. These affiliated societies or chapters have frequent local meetings inviting in influential men in each community and thru their publicity committee obtain helpful publicity in the local newspapers.

We must always bear in mind the fundamental principal and purpose of all registration laws as set forth in the Model Law "That in order to safeguard life, health, and property, any person practicing or offering to practice the professions of Engineering or Surveying shall hereafter be required to submit evidence that he is qualified so to practice and shall be registered." All other things associated with registration must be considered as secondary. This is the position the Ohio Board has taken and that position has been rewarded as is evidenced by the fact that Ohio after only six years of registration stands second in the United States in registrants. Ohio has 5.4% of the population and 11.9% of the registrants of our country.

I personally, believe that Engineer's Registration Laws can best be enforced thru the various local chapters of the State Society, the large majority of the cases being referred to the State Board and probably a few, but very few, to the duly constituted officers of the law backed by the Society as a whole. If this procedure is followed, I anticipate no difficulty in enforcement provided the public is sold on the merits of the law as I have heretofore stated. In Ohio every Court Decision and every Attorney General's Opinion has been on our side and we certainly cannot ask for more.

I do not believe we should employ inspectors as in my opinion this takes us out of the category of professional men and women and puts us in with the trades who have licensing laws. I furthermore do not believe inspectors should work out of the office of a board having semi-judicial powers as it is illogical for such a Board to act as both prosecutor and judge. The prestige of the Board is best maintained by its own avoidance of policing.

In Ohio we have a law which requires that "In all counties no person shall be eligible for the office of County Engineer or be elected or appointed thereto, except a registered professional engineer and registered surveyor licensed to practice in the State of Ohio." This section of the G. C. of Ohio has been upheld by the Attorney General and all of the Courts of Ohio, including the Supreme Court, even after ineligible candidates had been elected to the office by the vote of the electors in two counties. We are convinced that persons ineligible, in the future, will not spend their time and money trying to be elected to the office of County Engineer and enforcement in this respect will be automatic.

In the matter of the illegal use of the term "Engineer" as used in telephone directories and other advertising and professional cards, the Attorney General of Ohio has ruled that "under the provisions of Section 1083 G.C. of Ohio, a person who has not been duly licensed as a registered professional engineer, may not advertise in the State of Ohio that he is a civil engineer, or make use of some other similar title." We have found where such violations are reported that a letter from the Board is sufficient and causes the offender to discontinue the use of said term.

In the matter of the employment of registered engineers

(Continued on page 26)

Legal Registration of Professional Engineers

A Review of the Problems Faced and Progress Made to Date

By T. KEITH LEGARE, M. Am. Soc. C.E.

Member of A. S. C. E. Committee on Registration of Engineers; Executive Secretary, National Council of State Boards of Engineering Examiners, Columbia, S. C.

In 1907 Wyoming adopted the first state law regulating the practice of professional engineering and was followed closely by Louisiana in 1908, then by Illinois in 1915 and by Florida in 1917. However, it was not until the period from 1919 to 1922, when 17 states joined the registration group, that the registration of engineers became a nation-wide movement.

There now remain only six states—Delaware, Massachusetts, Missouri, Montana, New Hampshire, and North Dakota—which do not have laws requiring the registration of engineers, and three of these have active committees that are preparing such legislation. Hawaii, Puerto Rico, and the Philippines have engineering registration laws. The District of Columbia has a registration bill pending in Congress, and Alaska has appointed a committee to investigate the desirability of a registration law. Several states are now considering amendments to existing laws in order to include additional classifications or to improve the provisions for administration and general procedure. The trend of engineering registration in recent years seems to indicate that in a few more years every state in the Union will require the legal registration of all professional engineers who are in responsible charge of engineering work wherein the public welfare and the safeguarding of life, health, or property are concerned.

A significant feature of the administration of state registration laws has been the high type of personnel composing the state registration boards. Those serving on these boards have rendered effective and unselfish service to the public and to the engineering profession. There has been very little evidence of political activities, such as were predicted by opponents of registration and with few exceptions the administration of registration laws, with all its complicated problems, has been handled just as any other engineering project should be handled—efficiently and honestly.

Lessons drawn from experience of other professions

Some very appropriate statements were recently made in an address by Prof. C. C. Knipmeyer, member of the Indiana State Board of Registration for Professional Engineers and Land Surveyors and Director of the National Council. A part of this address follows:

"The history and experiences of other professional groups are worthy of closest study on the part of engineers. The licensing of lawyers was found imperative for the protection of the public. The fact that licensing proved also of benefit to the legal profession itself has never been counted objectionable. Public welfare also demanded the licensing of physicians. This licensing was a godsend to the public and proved a great uplift to the profession.

"The public trusted each of these two professional groups of law and medicine to administer its own licensing law with proper regard to public interest. Shortsightedness and failure to completely keep this trust has already cost the legal profession parts of its field of activity. Judicial procedures have been replaced by arbitration boards in many activities. Administrative boards in many lines are crowding lawyers out. It is to be noted, too, that failure of the medical profession to see fully its responsibility to the public, particularly to the poor, is resulting in a serious threat of socialized medicine. Physicians can combat this threat only by actively recognizing their public responsibility. It is to be hoped that this recognition is not coming too late. It is a well-established fact that no group can remain selfish and continue to retain power and influence long.

"Up to the present time the engineer is trusted by the public. He is known to be trained in the fixed laws of nature and in the greatest respect for them. His training is founded in honesty and in the highest ideals of service. He is thoroughly trusted to hold his profession to high standards. The force of law is placed in his hands to do this. It must be done well. The members of his registration boards are awake to this responsibility. Evidence steadily comes to them of fraud, incompetency, and violation of ethics. In this age of high-pressure fighting for advantage, the engineering profession cannot hope to avoid contamination of evil, without watchfulness and effort. Unity in thought and planning is necessary for this. There should be no disaffection in the family of engineers. The moral and ethical influence of the engineering societies combined with the force of law exercised by registration boards should keep engineering on the high plane where it can render the greatest service and earn and hold

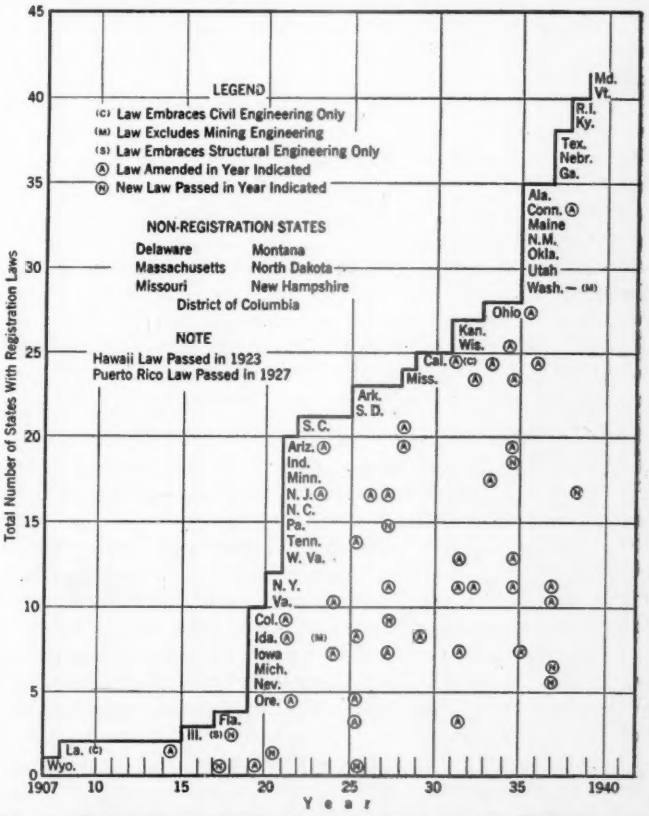

FIG. 1. PROGRESS OF LEGISLATION GOVERNING THE PRACTICE OF ENGINEERING

the highest respect and trust of the public. The mechanism for achievement is in the engineer's hands. He should make it function smoothly. It is a complete unit. Divided, it would fail. It must be kept complete; then the engineering profession can not only serve civilization in material ways as it is so abundantly doing, but be most effective and at the same time set the highest examples in matters of social organization."

The registration of engineers would have been more effective and of greater benefit to the public and to the profession had everyone concerned concentrated his efforts toward adoption of a general procedure for registration, reasonably high standards of qualification, and a fair scope of application or exemption.

The importance of a general knowledge of the fundamental principles of engineering—and what is sometimes more important, good judgment and common sense—is recognized by all, but it is not generally agreed that it is necessary to require each applicant for registration to have qualifications he may never need, or experience in a field of work in which he may never be engaged.

It seems desirable that the requirements and standards of qualification and of examinations for engineering registration be kept within reasonable limits, not too high to be attainable by the engineer of acceptable ability and not so low as to endanger professional competency. C. Julian Oberwarth in a statement regarding the reciprocal registration of architects uses the following expression, which seems to apply also to a satisfactory procedure for the registration of engineers: "The plan must embody something in the nature of a good sieve, with a mesh that would freely pass a really 'fine' man and stop the 'unfinished' or 'coarse' products."

There is a small group that is still opposed to registration for any members of the engineering profession. There are also some members of one or two branches of the profession who are in favor of registration for certain classes of engineers, provided that they themselves are not included. Then there are those who want all engineers registered, and who maintain that no one should be classified as an engineer unless he is legally registered.

It is believed that a large majority of state board members and of the engineering profession favor reasonable requirements and scope of application of registration laws, and that the extremes advocated by certain groups will probably never be indorsed or accepted by the states or by the profession.

State engineering societies and local sections of national societies have a real opportunity and obligation to render a definite service to their members and to the public, by assisting and cooperating with state boards and committees on registration, so that full benefit and protection may be derived from engineering registration.

Activities Recommended for Organized Engineers

The writer has suggested that state engineering societies and local sections of national societies could well participate in the following activities:

Legislation. They should promote and direct legislative bills and amendments that provide comprehensive registration laws for the protection and welfare of both the public and the engineering profession.

Personnel of Boards. The members of state boards of registration should be nominated by the professional engineers of the state and supported against undesirable political influence.

Enforcement. Violations of the law should be reported and assistance given in prosecuting cases.

Finances. Registration and renewal fees paid by engineers should be retained by the board and used only for the administration and enforcement of the law, and for contributions to the national fund for the coordination and improvement of registration procedure. State and national engineering societies should advocate this policy and oppose diversion of engineering registration funds.

The Committee on Registration of Engineers of the American Society of Civil Engineers has urged the appointment of Local Section committees on registration, and 45 Local Sections of the Society have reported the appointment of such committees. The Society's Committee on Registration is inviting other national societies to appoint similar committees in the various states and has suggested cooperation between registration committees of the different national societies.

In 1929 the National Council recommended to the American Society of Civil Engineers that its Committee on Registration of Engineers be authorized to compile a Model Law for the Registration of Professional Engineers and Land Surveyors, with the collaboration of the National Council and of national engineering societies. A series of conferences, attended by representatives of a number of engineering societies, was held and all provisions of a registration law were considered. On April 15, 1932, the model law was approved and recommended to states, societies, and committees "as a model to be followed in the framing of all new registration laws and the amending of existing laws." This model law was not changed until the spring of 1937, when three conferences were held at which some amendments were made. Previous to the adoption of the 1937 revised draft of the model law, it had been submitted to state boards, engineering societies, and individuals for suggestions and comments. Therefore this approved model law may be considered to represent the consensus of those experienced with, and most interested in, the registration of engineers. Although differing in some parts from it, approximately half of the existing registration laws are based on this approved model law.

Principal Features of Approved Model Law

The principal features of the approved model law are:

Definition—Professional Engineering

The practice of professional engineering within the meaning and intent of this Act includes any professional service, such as consultation, investigation, evaluation, planning, design, or responsible supervision of construction or operation, in connection with any public or private utilities, structures, buildings, machines, equipment, processes, works, or projects, wherein the public welfare, or the safeguarding of life, health or property is concerned or involved, when such professional service requires the application of engineering principles and data.

General Requirements for Registration

Section 12.—The following shall be considered as minimum evidence satisfactory to the Board that the applicant is qualified for registration as a professional engineer, or land surveyor, respectively, to wit:

(1) As a professional engineer:

Engineers—Graduation Plus Experience

a. Graduation from an approved engineering curriculum of four years or more in a school or college approved by the Board as of satisfactory standing; and a specific record of an additional four years or more of experience in engineering work of a character satisfactory to the Board, and indicating that the applicant is competent to practice professional engineering (in counting years of experience, the Board at its discretion may give credit, not in excess of one year, for satisfactory graduate study in engineering); or

Engineers—Examination Plus Experience

b. Successfully passing a written, or written and oral, examination designed to show knowledge and skill approximating that attained through graduation from an approved four-year engineering curriculum; and a specific record of eight years or more of experience in engineering work of a character

satisfactory to the Board and indicating that the applicant is competent to practice professional engineering; or

Engineers of Long-Established Practice

c. A specific record of twelve years or more of lawful practice in professional engineering work of a character satisfactory to the Board and indicating that the applicant is qualified to design or to supervise construction of engineering works and provided applicant is not less than thirty-five years of age.

Reciprocity

Section 19.—The Board may, upon application therefor, and the payment of a fee of ten dollars ($10.00), issue a Certificate of Registration as a Professional Engineer to any person who holds a Certificate of Qualification or Registration issued to him by proper authority of the National Council of State Boards of Engineering Examiners, or of the National Bureau of Engineering Registration, or of any State or Territory or Possession of the United States, or of any Country, provided that the requirements for the registration of professional engineers under which said Certificate of Qualification or Registration was issued do not conflict with the provisions of this Act and are of a standard not lower than that specified in Section 12 of this Act.

Saving Clause

Section 22.—This Act shall not be construed to prevent or to affect:

Employees and Subordinates

(d) The work of an employee or a subordinate of a person holding a certificate of registration under this Act, or an employee of a person practicing lawfully under Paragraphs *(b)* or *(c)* of this Section; provided such work is done under the direct responsibility, checking, and supervision of a person holding a certificate of registration under this Act or a person practicing lawfully under Paragraphs *(b)* or *(c)* of this Section.

The American Institute of Electrical Engineers published and distributed, during the past year, a "Draft of Model Law for Registration of Professional Engineers and Land Surveyors," which appears to be a new one; however, it is stated in the Preface of the A.I.E.E. draft: "The essential difference between the June 1, 1939, A.I.E.E. draft and other drafts is in the scope of application of the law as to exemptions and in the definition of professional engineering." The National Council Committee on Legal Procedure has been instructed to study the A.I.E.E. draft and report to the next annual convention.

The 1939 annual report of the Committee on Registration of Engineers of the American Society of Civil Engineers contained the following statement:

"*A.I.E.E. Model Law.* The members of the Committee have given this proposed law careful study and have reviewed the opinions of others. This draft copies, with a few changes, the Model Law that has been adopted in many states. The most significant departure from the established Model Law has for its obvious purpose the exemption of most electrical engineers from the requirements of legal registration, since the proposed law exempts all engineers who are 'not for hire to the public and not in public employment.' We do not believe that all engineers in industry should be exempt."

The National Council of State Boards of Engineering Examiners is an advisory and coordinating agency established primarily to assist state boards of registration for professional engineers in a more efficient and uniform administration of state registration laws; and its functions and activities include the certification of engineers, jointly with state boards, for reciprocal registration in the various states, and the operation of a national clearing house and information bureau for matters pertaining to the legal registration of professional engineers, serving state boards, state committees, engineering societies, individual engineers, and the public.

The National Council was organized on November 8, 1920, and will celebrate its twentieth anniversary at the annual convention to be held in Charleston, S. C., on October 28-31, 1940. The membership of the National Council now consists of 43 member boards, which are legally constituted boards of registration for professional engineers. These member boards represent a total of over 65,000 registered professional engineers and land surveyors.

The National Council publishes the proceedings of its annual conventions with other data in its year book, and also publishes quarterly *The Registration Bulletin.* A convention is held annually, the location being rotated among the four zones into which the Council membership is divided.

The National Council has been an active participant in the Engineers' Council for Professional Development since its organization and endeavors to cooperate with all state and national engineering societies.

The National Bureau of Engineering Registration is operated as a function of the National Council of State Boards of Engineering Examiners, under the direction of a standing committee of the Council, with an Advisory Board of representatives from national engineering societies. It was established primarily to minimize the effort and expense of engineers practicing in more than one state in securing interstate registration. The Bureau also constitutes a clearing house for state registration authorities, employers, societies, and others, acting as a reliable source of verified information regarding the professional records of engineers. The Bureau is a nonprofit agency and the fees charged represent only the actual cost of clerical work, printing, and postage.

Advantages of Certification by National Bureau

The question may be asked: "Why is certification by the Bureau desirable and why not grant reciprocal registration to any engineer who is registered in another state?" For ordinary state registration an engineer may possess qualifications that meet the minimum requirements for registration under the "grandfather" clause of the state law (or that are adequate for local conditions) and therefore be given state registration; whereas national certification by the Registration Bureau requires an independent verification of an engineer's entire record, evaluation, and certification as to meeting the minimum requirements of the approved model law (not the "grandfather" clause), a review (examination if required) by his own state board and a specific indorsement, recommending him for registration in other states.

Under the Constitution of the United States there can probably be no national registration in any profession, the authority to legally register or license citizens to practice a given profession being vested in the several states. Certification by the Bureau, therefore, is not a prerequisite for registration in any state, nor is it binding upon the state boards of registration, nor does the Bureau assume any responsibility to the applicant in securing his legal registration authorizing the practice of engineering. The by-laws of the National Council and the registration laws or regulations of most states specifically provide, however, for acceptance of certificates issued by the Bureau, and all but four of the member boards of the National Council have definitely indicated that they will accept certification by the Bureau, with indorsement by a state board, as competent evidence of qualification for registration.

(Reprint from the May 1940 issue of Civil Engineering). (Presented by Prof. C. C. Knipmeyer at the National Society of Professional Engineers' convention in Columbus, Ohio).

The Present Trend of the Engineering Profession

By WALTER H. WHEELER

Designing and Consulting Engineer, Minneapolis, Minnesota

Presented at N. S. P. E. Convention in Columbus

When your program chairman asked me to present a paper on "The Present Trend of the Engineering Profession" I suspected that it might be a difficult assignment.

It seems to be something which many talk glibly about, but when one tries to reduce it to concrete facts and figures the results are not entirely satisfying. When one begins to search for statistical information with which to support an argument he is reminded of that rather trite definition of an engineer: "one who continues to know more and more about less and less until he knows practically everything about nothing."

Realizing that it would be presumptuous for me to come before you and discuss this subject wholly unarmed with figures or statistics, I began a search through library, university, Government and engineering society records. With the aid of calculating machines and by making deductions, I succeeded in assembling some figures which are believed to be more or less reliable, and which do lead to certain conclusions as to the general trend in the last few decades.

The following table shows the total number of professional engineers in the United States for the years 1900, 1910, 1920 and 1930, the total population of the United States in those some years and the percentage of the population engaged in engineering work at each of the four periods. These figures were obtained from the Census Bureau and may be assumed to be accurate as to numbers. They probably include a good many persons who would not be classified by the engineering profession as engineers. In other words, the individuals classified themselves and the census takers accepted the classification. Another disturbing thing about these figures is that the Bureau's classifications have been changed from time to time.

Year	*Total Engineers*	*Total Population*	*Percent Engineers*
1900	43,239	75,994,575	.057
1910	88,755	91,972,266	.097
1920	136,121	105,710,620	.129
1930	226,249	122,775,046	.185

Thus we see that whereas in 1900 there was one engineer to each 1760 of population, the ratio had grown to one engineer for each 540 of population in 1930, or more than tripled in 30 years.

Now let us break these figures down into the various professional groups, and again compare them with the total population, taking first the largest group, namely Civil Engineers and Surveyors:

Year	*Total C. E. & Surveyors*	*Total Population*	*Percent C. E. & Surveyors*
1900	26,017	75,994,575	.034
1910	52,033	91,972,266	.057
1920	64,660	105,710,620	.061
1930	102,086	122,775,046	.083

This shows an increase in thirty years for this group from one in each 2930 of population to one in each 1200 of population, or a gain in the ratio of 143 per cent in 30 years. However, from 1910 to 1930 the increase was 46%, indicating a sharp slowing down in the rate of growth in this branch of the profession. This slowdown was particularly noticeable in the 1910 to 1920 decade and speeded up again from 1920 to 1930 during the boom period and the period of rapid expansion of highway construction. One survey by the Institute for Research reported 19,588 engineers employed by 43 state highway departments in 1935.

1910 is the first census in which electrical and mechanical engineers are separated. Beginning with that year the figures for the electrical engineers are as follows:—

Year	*Total Elec. Engineers*	*Total Population*	*Per Cent Elec. Engineers*
1910	15,278	91,972,266	.0166
1920	27,077	105,710,620	.0256
1930	57,837	122,775,046	.047

By this comparison we see that the number of electrical engineers jumped from one in each 6000 of population in 1910 to one in each 2120 of population in 1930, or a gain of 182% compared with 46% for civil engineers.

For the Mechanical Engineers, the figures are as follows:

Year	*Total Mechan. Engineers*	*Total Population*	*Per Cent Mech. Engineers*
1910	14,514	91,972,266	.0156
1920	37,689	105,710,620	.0376
1930	54,356	122,775,046	.0443

In this class which includes all engineers not otherwise classified, we find the ratio increased in 20 years from one in each 6330 of population to one in each 2260 of population, or a gain of 183%.

The last general group is the Mining Engineers, which includes also the Chemical and Metallurgical Engineers, and for this group we find the following:—

Year	*Total Mining Engrs.*	*Total Population*	*Per Cent Mining Engrs.*
1900	2,888	75,994,575	.0038
1910	6,930	91,972,266	.0075
1920	6,695	105,710,620	.0063
1930	11,970	122,775,046	.0098

This is the only group in which we find a slump after 1910. In 1910 there was one mining engineer to each 13,250 of population. In 1920 one to each 15,800 of population, and in 1930 one to each 10,250 of population, so that in the 20 year period the gain was about 30 per cent. However, in the period 1900 to 1910 the ratio of mining engineers to population gained about 100%.

These are the latest complete figures which I was able to find. They show some of the trends in which we are interested.

In the late nineties the gold rush to Alaska and the opening of the great iron ranges in Minnesota and other developments centered interest in mining. In the next decade there was a phenomenal increase in the number of mining engineers. This same period was the beginning of a great industrial expansion which carried through to 1930, and we find the combined electrical and mechanical engineers jumping from 14,334 in 1900 to 29,792 in 1910, which is equal to a gain of 72% in the ratio to population. However, the rapid gain in electrical and

mechanical engineers carried on through to 1930, whereas the growth of the other two main groups slowed down. It will be interesting to see what has happened in the last 10 years when the 1940 census is available.

For the rest of this discussion I shall have to rely on fragmentary statistics and general personal knowledge. By using the census of 1930 and a tabulation by the Russell Sage Foundation of the membership of the four founder societies, we can glimpse the relation of these societies to their respective groups:—

	Members		1930 Census	% of total in Society
Am. Soc. C. E.	1935	13,988	102,086	13.7%
Am. Soc. M. E.	1934	11,480	54,356	21.2%
Am. Inst. E. E.	1934	13,335	57,837	23.1%
Am. Inst. M. & Met. E.	1935	5,183	11,970	43.3%

This comparison shows that the American Society of Civil Engineers numbers by far the smallest proportion of those listed by the census bureau as civil engineers, whereas the American Institute of Mining & Metallurgical Engineers numbers nearly one-half of those classified by the Census Bureau as mining, metallurgical and chemical engineers. One might draw the conclusion from this comparison that the mining and metallurgical engineers are more professionally conscious than the other groups, or shall we say more technically conscious. One might also draw the conclusion that fewer persons have classified themselves to the census taker as engineers in this group who should not have the title of engineer.

Perhaps the most important trend and the one which is making it the most difficult to retain our status as a profession, is the one which has changed us from a group of private practitioners in the 19th century to a group of employees of great private corporations and public corporations in 1940. In a book entitled, "The Professional Engineer," published in 1936 by the Russell Sage Foundation, it was estimated that possibly 95% of all engineers were employees. The author went on to say that this is a trend over which the engineers have no control, as it is due to changing conditions.

The Bureau of Labor Statistics has published the results of some recent surveys which show the rapid increase in the number of engineers in public employment and I will present some of these figures. They were obtained through questionnaires by the so-called sampling method.

	1929	1932	1934
Replies to the inquiry	31,252	35,691	39,161
In engineering employment ...	29,051	27,787	30,299
In private engineering employment	22,456	19,797	20,619
In public engineering employment	6,595	7,990	9,680
In non-engineering employment	1,969	4,290	5,523
Unemployed	232	3,614	3,339

In the foregoing tabulation, private engineering employment includes those in the employ of private firms, independent consultants, "any other employment" and teaching. Public engineering employment includes those in the employ of Federal, State, County and Municipal Government and other public authority. Reduced to percentage of those in engineering employment, we find as follows:—

Year	Private	Public
1929	77.5%	22.5%
1932	71.2%	28.8%
1934	68.0%	32.0%

In the group which included civil, agricultural and architectural engineers, the percentages are as follows:—

Year	Private	Public
1929	54.3%	45.8%
1932	37.6%	62.4%
1934	31.8%	68.2%

Thus according to this survey the percentage of all engineers in public employment increased almost 50% from 1929 to 1934. In 1934 approximately one-third of all engineers and more than two-thirds of all civil engineers were on the public payroll.

Now let us see what happened to the independent consultants included in this survey.

Year	Eng. Employment	Total in Consultants	Percent
1929	29,051	1,303	4.5%
1932	27,787	1,459	5.2%
1934	30,299	1,243	4.1%

The increase in 1932 is explained as due to the fact that some employed engineers who lost their positions, temporarily engaged in private practice. Their number had again been reduced by 1934, and the trend toward extinction resumed.

A committee of the American Society of Civil Engineers was authorized in 1913 to make a survey of that profession. In the report which they submitted in 1917 they classified the replies to their questionnaire as follows:

Employment	Number	
1. States and counties	387	
2. National governments	575	
3. Municipalities	764	1726
4. Technical schools	262	
5. Railroads	814	
6. Private companies	2198	
7. Contractors	165	3439
8. Consulting engineers	620	620
Total	5785	5785

These are the only figures I have been able to obtain for any year prior to 1929. They cover a much smaller total number than the surveys of the Bureau of Labor Statistics quoted for 1929, 1932 and 1934, and therefore may not be as representative. According to this tabulation, 30% of the civil engineers were in public employment and 70% were in private employment in 1916, whereas in 1934 the percentages were 68.2% in public employment and 31.8% in private employment. It should also be noted that in the tabulation of 1917, 10.6% of the civil engineers were classified as consulting engineers, whereas in 1934 4.1% of all engineers were so classified.

The American Society of Civil Engineers publishes *Civil Engineering*. From 1932 to 1939 the number of subscribers in public employment increased 37%. Practically all of this increase was in employment by Federal and Foreign Governments.

In 1930 the Census Bureau gives the number of engineers in public service as 24,990 or about 11% of the total number of engineers. The discrepancy between this figure and the others quoted was so large that I inquired further and was advised by the Chief Statistician of the Census Bureau as follows: "Some of the technical engineers whose place of employment was not definitely stated on the enumerators' schedules doubtless were employed by Government." When this figure of 24,990 for all engineers in public service is compared with 19,558 engineers in 43 state highway departments in 1935, previously quoted, and also with the surveys of the Bureau of Labor Statistics, one is inclined to give less weight to

the Census Bureau figure. It is to be hoped that the 1940 census will make every effort to classify accurately the employment of all engineers.

In connection with a study of Civil Engineering as a career, Dr. Vannevar Bush, Dean of Engineering at Massachusetts Institute of Technology, said that the Consulting Engineers should be supported by the corporations and by government, otherwise there will be no engineers to make independent reports when they need them, or to act as experts in litigation, or do any of the other things which engineers in private practice can do so much better than engineers in the employ of the public or of corporations, because they are free agents.

I would like to submit a question for your consideration: If we as a profession fail to preserve the opportunity for engineers to engage and prosper in private practice, will not our profession lose its status as a profession and become a trade or a craft?

It seems to me that this is a very serious question for the engineers to think about. How it is solved may have a profound effect upon the future development of our profession and also upon the national progress and development of the United States.

What shall we say of the rapid drift toward socialization of engineering? (One-third of all engineers, and two-thirds of the civil engineers, already on the public payroll.) Is this a temporary condition? What effect will it have on our professional status and is it in the best public interest?

My own experience over a long period of years has convinced me that neither engineers or the members of any other professional group can function freely and at their best when they occupy positions that are dominated by politicians. No doubt an effective civil service system frees them to some extent from political domination, but it certainly does not make free agents of them or encourage individual initiative and that independence of thought and action which is most essential to progress and to the development of new methods and new ideas.

The Russell Sage Foundation says we can't help it, it is due to changing conditions. I like much better the suggestion of the Dean of Engineering at Massachusetts Institute of Technology, namely, preserve private practice by giving the men in that field the opportunity to use their abilities and their ingenuity and their independent thinking. What I am saying may have political implications, but it has nothing whatever to do with partisan politics. I believe it has much to do with the future welfare of the engineering profession and with preserving it as a profession. I believe there is a practical way to do this, and to carry out the suggestion of Dean Bush, without injuring anyone or taking his job away. This plan, in-so-far as the Federal Government is concerned, is embodied in a bill, HR 7635, introduced in the House of Representatives at Washington on January 3d by Hon. John G. Alexander of Minnesota. This bill give authority to the various departments and bureaus of the Government to employ engineers and/or architects in private practice on Government projects and pay for their services, and it also authorizes their employment on a semi-contingent basis to prepare alternate designs for government projects, no fee to be paid unless the bids on the alternate are less than the bids on the base design of the Government by at least twice the amount of the fee. Some, I know, are opposed to contingent fees. However, they serve a very useful purpose in the legal profession. I believe that since engineering is almost wholly commercial, regardless of whether the work is public or private, contingent fees are entirely proper and desirable under the circumstances.

Unless some such specific authority is given the Government departments and bureaus as is provided in this bill, I am advised that our Government cannot employ us or use our services in any professional capacity, only as employees. The Alexander bill is an enabling act to grant the necessary authority.

The governments, Federal, State and Municipal, are as a rule far less concerned about efficiency and economy than private corporations—if they can get the appropriation they spend it. They frequently turn a deaf ear to any plan which might lead to the employment of engineers in private practice on their work. One chairman of a State Highway Commission asked me several years ago,—"How is our highway department ever going to learn to build bridges unless we let them build them?" No doubt he was partly right. It seems to me that if he had been spending his own money instead of the public's money he would have wanted his boys to work under the direction and supervision of competent and experienced bridge engineers. He would have called in consulting engineers who were qualified to do this work for his department while his men were learning and the results would have been much happier all around.

I submit, gentlemen, that the principles involved in the Alexander Bill are the principles which will help to preserve engineering as a profession and prevent it from becoming a trade, and that they should apply not only to all of our public work but also to the engineering work of large corporations. It seems to me that if we cannot preserve engineering as a profession, free from domination, our status in public as well as private employment will surely change. It is my firm conviction that the change will not be in the best interest of our members or in the best public interest.

Enforcement of State Registration Laws

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by the State of Ohio, we have had no difficulty, the heads of the various departments employing engineers, such as Highway, Public Works, Public Utilities, Public Health, etc., have all cooperated to the fullest extent, requiring that all engineers in responsible charge of engineering work be registered. We are also experiencing but little difficulty in the enforcement of the law in the villages and cities. The Public Utility companies are insisting that their engineers be registered and many of the courts are accepting as competent, only the testimony of *registered* engineers.

I am further pleased to say that the various public works agencies maintained and operated by the Federal Government are insisting that their engineers in responsible charge of important engineering work be licensed to practice in the State of Ohio. This being accomplished thru the cooperation of the many splendid personalities in charge of this work in our State.

The only complaints that we find hard to handle are those pertaining to fees and unethical practices, those things not set down by statute and requiring a different method of handling. As to the matter of uniform fees, it is my opinion that we have this thing more nearly under control than the lawyers, physicians or dentists

who have had licensing laws for many years. This must be done thru the influence of the societies as it is my firm opinion that fees cannot be regulated by law and still keep the good will and support of the public. I know of no organization, professional, business or labor that comes as nearly accomplishing this result as we do right here in Ohio. Another difficult problem is the furnishing of "free" engineering services by material and manufacturing concerns. The engineers working on this type of service are generally highly competent and nothing can be found whereby their license could be revoked on the grounds of incompetency. In fact, a great many engineers call upon them for advice and suggestions on highly specialized problems. In my opinion this problem must be tackled by a large engineering society with local chapters in every county and as nearly as practical 100% of the practicing engineers in the state being members instead of 14 percent, as in Ohio. To cope with this last situation it seems to me that it will be necessary for Engineers in private practice to attempt some salesmanship and promotional work in this highly competitive world and seek out new business, just as do the manufacturers, where it can be definitely demonstrated that a prospective client can be saved money in the operation of his business or the erection of his structures. This field should be especially fruitful for the Mechanical, Electrical and Industrial Engineers. With this idea there may be considerable difference of opinion, and if so, time permitting, I should like to hear some discussion of the matter or I will be glad to attempt to elaborate further on any point brought forth in this discussion of the subject "Enforcement of State Registration Laws."

Should the Engineer Ignore Civic Affairs

(Continued from page 19)

that human beings do not respond to natural laws in the same manner as do the materials of earth. To my mind, this is the crux of the problem confronting both society and the engineering profession. Somewhere, somehow, in the not too distant future, there must be established some agency competent to draw a line between that which is proven science and that which, at best, is philosophy. The latter may be beautiful,—it may represent thought of a higher order than science, and no one has a greater interest in it than the speaker,—but there is a world of difference between speculative philosophy and science, between belief and knowledge. The establishment of an Institute or Board of competent scientists empowered to prevent the abuse of the term "science" would, in my judgment, be a long step toward the solution of many of our social and economic problems. Today, we have all too many so-called social sciences. Despite the fact that the combination of terms used should be sufficient to indicate the impropriety of terming them sciences, the institutions of learning so teach them and young men and young women are prone to believe that some theory of sociology, some doctrine of political economy or some concept of psychology, is as truly a science as is chemistry or physics regardless of its inconsistencies or shortcomings. An effort to correct this prevalence of unsound thought is an opportunity as well as an obligation that the engineer owes to his county, state and country. Such corrective effort would serve as the first step toward a truly scientific endeavor to develop a more satisfactory social and economic civilization. The engineer with his contributions of the moment is continually determining the society of tomorrow. Through the ages, different callings have exercised a dominant influence on man's existence. No civilization, however, has ever been so clearly indicated in advance as that upon whose threshhold we now stand. Perhaps the most eloquent words on this subject came from the President of the United States. Several years ago, when the speaker was president of the National Society of Professional Engineers, he received a personal letter from President Roosevelt wherein the letter said "All professional groups can with clearer understanding help in the achievement of this goal (the civilization of tomorrow), but the engineering profession is in a position of unusual privilege and corresponding responsibility in the matter. Because of their special training they have potential ability to perceive earlier and more clearly than others the ultimate technical results of their discoveries and inventions and the ultimate influence of these achievements upon human life."

I submit, gentlemen, that these words are more eloquent than any I might offer. My answer to the question "Should the Engineer Ignore Civic Affairs" is an emphatic "No" as a citizen; a definite "No" as a professional man; and an appealing "No" as an engineer, unless, of course, he is willing to choose oblivion rather than Excelsior as the goal of his profession.

Registration and Engineering Schools

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tions. There is a persistent reaction from alumni, as well as a tentative suggestion from the organizations of the profession, that technology alone is not sufficient. Details of the arguments on this point are not significant. If the premise is admitted the conclusion is inevitable, that additional time is required for the training of an engineer. No single college can afford to try this experiment. If the profession wants more elaborate preparation it must give support to the idea, possibly with the force of a demand, that educational institutions agree in a concerted movement towards an extended period of training.

If registration and education are both mechanisms for the development of the engineering profession, there can not be any fundamental conflict between them. But the need for progressive action on the one side, and the tradition of evolutionary development rather than miraculous creation on the other, point to the necessity for conscious correlation and synchronization rather than spontaneous reaction as the method of rational progress. The awakening of professional consciousness and the demand for professional recognition have posed educational problems which can be solved only by the correlated efforts of the colleges supported by unity in the profession.

Lawyers to Force State Society Membership

Lawyer delegates from all parts of Ohio met recently to vote on a sweeping internal change in their profession as the sixtieth annual Ohio State Bar Association convention went into its second day in Hotel Statler.

Delagates were considering the establishment of an "integrated" bar organization for Ohio—one in which all lawyers must be members before they can practice in the state.

Eight-Year Campaign

The plan has arrived for positive action after an eight-year campaign by leading attorneys and judges who advocated a centralized organization which would have complete disciplinary powers over its members in a representative system of government.

Under the integration plan all lawyers would pay a fee of $8 a year for membership in an "Ohio State Bar." If they wished to belong to any local bar association, the status of which remains

unchanged under the plan, part of their state fee would be applied to the local association.

Calls for Referendum

If today's vote is favorable a referendum will be held among all members of the state association. If a minority favors the plan it will be presented for incorporation by the Ohio Supreme Court which controls the admission and discipline of practicing lawyers.

Principal speaker at the morning session was Carl R. Henry, president of the Michigan State Bar, where the integration plan has been in effect four years.

Another distinguished convention guest was U. S. Senator Robert A. Taft, who was to address a luncheon meeting of the Harvard University Law School alumni.

(Reprint from the Cleveland, Ohio News).

A Corporation May Not Practice Engineering

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ance of our proposition dated May 25th, *in which you employ us as Engineers and Architents* for the rehabilitation of your Brewery plant at Conemaugh . . ." There is no doubt therefore that the plaintiff, as a corporation, contracted to perform these services under the style and designation reserved exclusively for members of the two professions, in violation of the Acts of Assembly regulating the subject. The record also discloses that the plans were not signed with the true appellation of the authors as required by Section 13 of the Act of 1919, as amended, and that Section 8 of the Act of 1927 was violated by the failure of the plaintiff corporation to have the plans signed and sealed by a registered engineer. The only signature is that of Bollinger, who testified that he was not a registered engineer or architect.

Plaintiff urges that, though it may have failed to comply with the requirements of the statutes, there is no express prohibition contained therein against the enforcement of contracts made in violation of their provisions; in other words, there is nothing in these acts which forbids recovery for the services it rendered. However, it is well settled that the courts will not lend their aid to the enforcement of unlawful contracts which are founded upon transactions in violation of a public policy declared by the legislature. We have followed this principle and denied recovery for services where there has been a failure to comply with statutory requirements for licensing and registration. In many such cases there was no express provision in the statutes denying recovery upon the contract.

For example, we have refused recovery of compensation to unlicensed insurance brokers despite the absence of a specific expression of legislative intent. See *Reilly v. Prudential Ins. Co. of A.*, 264 Pa. 61. In *Golder v. Rabinowitz*, 125 Pa. Superior Ct. 573, it is said (p. 579): "The plaintiff cannot recover for a service which he was prohibited by the statute from performing; . . . The clear purpose and intent of the Act . . . . is, that the transaction of business contrary to law should not receive the aid of courts, by permitting recovery of commissions . . ." Even before the passage of the Act of May 1, 1929, P. L. 1216, expressly denying recovery of compensation to unlicensed real estate brokers, we held that the contracts of such persons were unenforceable. See *Johnson v. Hulings*, 103 Pa. 498; *Verona v. Schenley Farms Co.*, 312 Pa. 57, 65-66; *Sherman v. Welsh*, 87 Pa. Superior Ct. 282. In *Luce v. Cook*, 227 Pa. 224, we said (p. 225); "This rule rests upon the theory that since the law prohibits under a penalty the doing of business by unlicensed brokers, contracts providing for the payment of commissions to such persons are opposed to good morals and public policy and cannot be enforced."

There is no force to plaintiff's contention that the penalties imposed by these statutes are intended to be the sole punishment for infractions thereof. If the courts were to enforce such unlawful contracts the relatively small fines to which violators of the law are made subject would be insufficient to discourage repeated violations. See *Holt v. Green*, 73 Pa. 198; *Swing v. Munson*, 191 Pa. 582; *Meyer v. Wiest*, 250 Pa. 573; *Employers M. I. & S. Co. v. Pakradooni*, 84 Pa. Superior Ct. 532; *Brenner v. Pecarsky*, 86 Pa. Superior Ct. 414.

Plaintiff also argues that as it has performed the services stipulated, it would be a hardship if defendant were permitted to evade a just obligation. But it is a hardship created by plaintiff's own conduct and not by the harshness of the rule of the law. In *Hazle Drug Co. Inc. v. Wilner*, 284 Pa. 361, we said (p. 368): "The rule preventing recovery of an illegal contract is founded public policy, not through any regard for him who sets up such a defense . . ." And see *Delaware R. Q. Etc. Co. v. Pass. Ry.* 204 Pa. 22.

Plaintiff calls to our attention cases decided under the Fictitious Names Act, such as *Lamb v. Condon*, 276 Pa. 544, and *Rome S. & S. Station v. Finch*, 111 Pa. Superior Ct. 226, but they have no application here because the purpose of the legislature in adopting that particular statute was limited to the protection of individuals from fraud. In the Acts now before us, however, the interest of the public at large is involved. The purpose of the Engineering Act of 1927 is stated to be "to safeguard life, health and property." Architecture and engineering are learned professions with high standards for membership, and it is the intention of the legislature that they should be protected from the encroachments of unauthorized practice, so that the public may not be injured thereby. As we said in *Com. ex. rel. v. Humphrey*, 288 Pa. 280, 286: 'Of course, under what circumstances the safety and welfare of the community require the protection afforded by a professional registration act is primarily for the legislature to decide, and when that body concludes that engineers—who have to do with the construction of our great bridges, reservoirs and buildings, together with other structures which touch the daily life of all the people—must have their qualifications certified by the State, we can hardly say that such an act is prima facie an abuse of the police power; . . ."

The case of *Simons, Brittain & English, Inc. v. Armstrong*, 86 Pa. Superior Ct. 98, upon which the plaintiff strongly relies, is not in conflict with the conclusion we have reached. In that case a corporation recovered for services rendered in the preparation of plans and specifications for a theatre and store building. The plans were signed by a duly registered architect. The court said (p. 101): "We find nothing in the case that would indicate that the plaintiff corporation offended against the act, or that it claimed to be an architect . . . If this corporation had held itself out as an architect, then it would have come within the prohibition of the act . . ." In the present case, as we have seen, the plaintiff corporation did hold itself out to be an architect as well as an engineer. As the suit was here brought by the corporation, and not by Bollinger individually, the case of *McClymont v. Gitt*, 90 Pa. Superior Ct. 395, has no application.

We therefore conclude that plaintiff is not entitled to recover for the services which it has rendered, and the verdict in its favor must be set aside. The judgment of the court below is reversed, and is here entered for the defendant upon the whole record.

Judgment reversed.